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THE CARRIAGE OF SCHISTOSOMES FROM MAN WITH SPECIAL ATTENTION TO THE MOLLUSCS WHICH ARE THEIR LARVAL HOSTS IN DIFFERENT PARTS OF THE EARTH¹

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That against the view of Looss molluscs take a necessary part in the development of schistosomes came sharply to the front with the statement by KUNAGAWA (1914 3, 289-90)² of Miyaini's discovery of a larval stage of *Schistosoma japonicum* in a *Lymnaeus* species. LEIFER and ATKINSON (1915 6, 293) were unable to get Miyaini's paper through good bookstores in Japan but their investigations there made it clear that the development of this trematode from miracidium to cercaria took place in a mollusc, named in an addition to their paper *hatajama nosophora* Robson 1915 after the place from which it had come. While in 1907 SAMBON³ had from its form given the name of *S. mansoni* to the egg with a spine at the side it was Leiper (1916 1, 347) who gave proof not only that the two sorts of egg came from worms which when of full growth had a different structure but that the carriage of the two species from man to man took place in Egypt by

But for the words necessary for biology, parasitology and medical science which have not so far been covered by the system this paper, unless otherwise indicated thus — is in Basic English keeping to 850 words in the general list and those in the short special lists for general science and chemistry or in general international use. The writer is of opinion that only in some such way may material in this *Bulletin* be made of the most value for those whose language is not English. He is under a strong sense of debt to Professor C. H. ODDES and Mrs. L. W. LOCKHART (of the Orthological Institute 14 Dartmouth Street London, S.W.1 and 10 King's Parade Cambridge) for most kind help on this point now and in the past.

References, unless otherwise stated, are to summaries in this *Bulletin* the first figures giving the year the second in blackface type the volume number and the third the page of the *Bulletin* containing the summary in question. Where the year of publication of the original paper differs from the year of publication of the *Bulletin* summary two dates are given—the first in brackets referring to the original paper and the second to the *Bulletin* summary—Ed.

molluscs which zoological grouping had placed in different genera. Now the units of zoological grouping are man-made and the ideas of different men on the facts which may rightly be used for this purpose, are not the same. The base used here is individual and anatomical, such as that put by SANDGROUN ((1934) 1935 22, 300) in these words "In order to establish a new species safely it is necessary to point out constantly present and if possible easily recognisable, zoological characters by which it may be distinguished from related forms." Zoology is one and though there is a division into such "races" as Hebrew and Nordic, Hottentot and Negro Mongol and Latin *Homo sapiens* in the view of anthropologists is one species and the same range of qualities in the species has to be kept even for molluscs and worms.

The best chain of facts which may be offered in support of the view that a certain mollusc is the intermediate or larval host of a certain schistosome is that put forward by GORDON DAVY and PRESTON ((1934) 1935 22, 237). Their molluscs were of laboratory growth, so that unnoted natural infection was not present. Infection was given by miracidia from eggs whose species was certain, and the cercariae coming from the molluscs gave the infection to clean animals, as was made clear when worms of full development were seen in the veins.

THE GENUS *SCHISTOSOMA*⁴ IN MAN

In addition to the three blood flukes of which man is the optimum host (*S. haematobium*, *S. japonicum* and *S. mansoni*) man has been said to be a harbourer of others—a decision has to be made on this point before going into the question of carriage. In some cases this statement has been based on the size and outline of the egg—then again the morphology of cercariae which have come out of a mollusc has been used to put that animal among the larval hosts of a schistosome of man. Are these beliefs true?

A. The egg in the diagnosis of the species of man's schistosomes.

The size of the egg—It was noted by COX ((1915) 1916 7 353) that eggs of the fluke *Parmacotyle simulans* were very different from one another the greatest being 33 per cent. longer than the smallest. Again it was noted by VITELLA and LE ROUX ((1929) 1931 28, 185) that BARTOLINI, in 1908 gave these mean dimensions (in millimetres) for the eggs of *S. bovis* in the womb a uterus 0.145 by 0.037 in the wall of the intestine 0.188 by 0.044 and in the faeces 0.230 by 0.056. Measuring is no use as a test for species if facts such as these have not been taken into account.

The outlines of the egg—Now that time has given proof that Sambon was right in making *S. mansoni* into a new species for this reason other attempts in this direction have been made from time to time.

⁴ The valid name of the genus is put by SIECK ((1931) 1932, 29 167) as *Bilharzia* Mackal, 1856 that name being earlier than *Schistosoma* WERNER, 1858, *Gymnophorus* DUMÉNG, 1868, and *Bilharzia* COBBOLD, 1858. But by Opinion 77 of the International Commission on Zoological Nomenclature the name *Schistosoma* is on the Official List of Generic Names, and it is the valid name while it is on that list.

THE SCHISTOSOMES NAMED FROM THE EGG

S incognitum Chandler 1926.

CHANDLER (1926) 1927 24, 174 made the discovery of schistosome eggs in faeces resting on the earth near Krishnagar Bengal India this place was used for defaecation by man and the faeces in question had the look of those of man so his opinion was that schistosomiasis of man was present in India and the species was named by him *S incognitum*. This place was near to a group of houses of pig keepers whose pigs went to it frequently to take as food the faeces of man Chandler made a like discovery at Kalimpong on the lower slopes of the Himalayas and in this place as in the other pigs were common The material inside these eggs was without structure. SAUNDERS ((1934) 1935 32, 247) gave an account of schistosome eggs in pig's faeces which in his belief were the same as those seen by Chandler. He gave the parasite the name *S suis* a synonym if his belief is right An explanation of the fact that there was no structure in Chandler's eggs may be that while in the parent worm they had got into the alimentary canal of some person or some animal and their protein structures had undergone digestion before they became part of the faeces.

There is then no good reason for the belief that these eggs came from worms which were parasites in man and much for the suggestion that they did not.

S faradjei Walkiers 1928.

An account came from Faradje in the Upper Welle Belgian Congo (WALKIERS 1928 25 945) that in five of a great number of investigations of faeces there were seen eggs with no spine to them In his discussion of the paper RHODAINE said that such eggs had been seen in Egypt and the Sudan. Later it was pointed out by VAN DEN BERGHE ((1934) 1935 32, 242) that even the size of the eggs had not been given by Walkiers. There is no proof at present that the name is that of a separate parasite of man.

S bovis Sonsino 1876 and *S mattheei* Veglia and Le Roux 1929

Two questions come up here.

1. Are *S bovis* and *S mattheei* different?—Veglia and Le Roux made *S mattheei* a separate species by reason of the size and habitats of the worms and the form of the eggs. But while noting that living worms which are dropped into certain solutions undergo much contraction they kept their worms in normal salt solution (in which they do not) till death came about, but gave no account of any attempt to see that the size of *S bovis* as given by other workers and taken as right by themselves was measured in these special conditions. It would be surprising if it had been so that this support for their suggestion is not good. In the first account of them the eggs of *S mattheei* were said to be oval or fusiform with a well-marked spine at the end but BLACKIE (1932, 29 401) when picturing the egg made a selection of one representative of *S bovis*. As to habitat Veglia and Le Roux say that

their new species has never been found invading the urino-genital organs nor producing lesions as recorded for *S bovis* by Sonsino Khalil and others. But it was pointed out by MACHATTIE MILLS and CHADWICK ((1933) 1934 31, 114) that Sonsino made in fact no statement that *S bovis* was a parasite of the genito-urinary system—it is a parasite of the intestine in addition after looking at 4 000 examples

of *S. bovis* they came to a decision that the account of *S. mattheei* given by Veggia and Le Roux is that of *S. bovis* as present in Iraq that in one per cent. of female *S. bovis* are seen some uterine eggs with *S. haematobium* outline among a number with that of *S. bovis* and that in 0·2 per cent. of female *S. bovis* there are eggs of *S. haematobium* outline only that *S. mattheei* is a synonym of *S. bovis* and that "one of the great difficulties in the elucidation of this problem is the desire of workers to create new species on what appears to us to be the most trifling variations—variations which in other members of the animal kingdom would be considered of no significance. How like this view is to that of SANDGROUND (see above p. 2)!"

2. *Are these forms even if saprals parasites of man?*—It was noted by MACHATTIE MILLS and CRADWICK that though eggs with the outline of those of *S. bovis* have come from man (see CAUETON (1921) 1922 19 204) this has only been so when in addition those of *S. haematobium* were present. Again these workers have seen such eggs, frequently with development not complete in tribal Arabs in parts of Iraq where there has been no discovery of *S. bovis* after very detailed investigation. In addition they give a microphotograph of a uterus of *S. bovis* in which are two eggs side by side and partly covering one another one with the outline of *S. bovis* and the other with that of *S. haematobium* they have been unable to get infection of man with *S. bovis* and they make the point that there is no experience of full growth, in an animal, of *S. bovis* from an egg to man's urine which has that special outline. Their view is that when the shell gland is not normal there may come into existence in it some eggs having the outline of those of another species of schistosome and that *S. bovis* is not a parasite of man. Even so in view of the general behaviour of parasites in non-optimum host species, there will not be agreement that the last is a statement of a completely unchanging rule. These writers have again and again seen an infection caused in *Bulimus truncatus* by miracidia of *S. bovis* and in Corsica its larval host is *B. condortus* (BRUMPT (1928) 1930 27 485)*.

S. intercalatum Fischer 1934

In giving this name FISCHER ((1934) 1935 32, 236) had in mind those schistosomes whose eggs have a spine at one end and which are the cause of intestinal symptoms only. That there may sometimes be seen eggs with this outline in the faeces, and eggs with the spine on the side in the urine is common knowledge but that end-spined eggs may in Equatorial Africa only be limited to the faeces was first pointed out by LECRE (1923 20, 819). The same experience is that of CHESTERMAN (1923 20, 839) and of SCHWARTZ and BAUMANN ((1930) 1931 28, 194) round about Stanleyville Belgian Congo of CHARLIER and CHARLIER-COLLON from Katalo-Katanga, Belgian Congo of NESSMANN and TRENKE (1928, 25, 946) from the Gabon in French Equatorial Africa, which is west of the Belgian Congo of FAANGA ((1925) 1928, 25, 456) from Angola and W Africa, with some support for the view that *Physopsis globosa* is the larval host, though *Planorbis pfeifferi* is very common there of LECRE (1923 20, 819) from Senegal and of LAGRANCE (1920 16, 135) in a boy who had it seems journeyed across most of Equatorial Africa. FISCHER's work was at Yakusa, Stanleyville worms of full development were not seen because

* As noted (footnote p. 5) Bayle makes *B. condortus* a synonym of *B. truncatus* itself a larval host of *S. haematobium*.

autopsies were not possible. As to development of miracidia in molluscs these words of LEIPER and ATKINSON (1915 6, 296) used in connexion with miracidia of *S. japonicum* are very important. The blunderbuss method was again relied on. This is briefly to submit all likely hosts to an overwhelming infection. The proper host will show a marked even fatal susceptibility. *K. nasophora* showed an extraordinarily marked attraction for the miracidia as contrasted with the other species. In FISHER's belief a *Physopsis africana* subspecies was the larval host of *S. intercalatum* but he says nothing of any attraction of miracidia to this mollusc though he does say that he was unable to get any infection to take place in it. A most important unit in the chain of proof is not there at all. The reasons for FISHER's opinion that this was the line of development were these. From *Phys. africana* came cercariae of human type with growth to full development in the mouse (*Mus musculus*) the length frequency curves of the eggs in the uterus of these worms and their size outline and range of variability in the faeces of *M. musculus* were the same as those in the faeces of man. The position in fact is that in no detail of form were the worms in *M. musculus* certainly different from those in man that when the sizes of eggs were mapped in curves the top of the curve from the eggs of *S. intercalatum* was between the tops of those from the eggs of *S. bovis* and *S. haematobium* and that parts of the two other curves were covered by its base and that the outlines of the eggs had details of the two species. In other words one will frequently be unable by size or outline to put a given egg into this species or into one of the others. FISHER made this statement. If we retain our present criteria of species in this genus we must conclude that the schistosome with which we are dealing is a new species. The opinion that the fact of being as little different as this from others is enough for the making of a new species is not the anatomical one of Sandground or that of the present writer. In the writer's belief FISHER's opinion is still without proof and in VAN DEN BERGHE's ((1934) 1935 32, 242) the division lines between *S. haematobium*, *S. bovis* and *S. intercalatum* are not sharp. It may be noted that *Phys. africana* var. is most frequently seen in calm shallow shady water with decaying vegetation, that eggs are present all the year round and that there is ready carriage of the mollusc by a strong current.

S. spindale Montgomery 1906

CAWSTON ((1925) 1928 23, 246) gave his experience of a boy with a number of schistosome eggs in the urine most being of *S. haematobium* outline but about 1 in 6 having that of *S. spindale* possessing a straight border when viewed from the lateral position but presenting the appearance of the outline of *S. bovis* when viewed from above. The egg was 0.24 mm. long. If the eggs were those of *S. spindale* the blood fluke of the Indian cow had got into a South African boy. Another explanation would be a diseased shell gland (see MACHATTIE et al under *S. bovis*). In Bombay the mollusc host is *Planorbis eximius*.

B The use of the morphology of cercariae for the discovery of the larval hosts of the different species of Schistosomes.

If it were possible to say that any cercaria seen coming from a mollusc was that of a certain species of schistosome the discovery of

the larval hosts of that species would be simple. Unhappily there is no agreement as to the anatomical details of the cercariae of the schistosomes of man.

For example in *Cercaria haematoebia* there have been said to be three "mucin head or penetration" glands a side by FAUST ((1920) 1921 17 55) BETTERCOURT and DA SILVA ((1922) 1923 20, 218, 1925 22, 963 (1928) 1930 27 457) CAWSTON ((1922) 1923 20, 941) and ARCHIBALD and MARSHALL (1933 30, 674) and five of these glands a side by BLACKLOCK and THOMPSON (1924 21 940) VOGEL (1932, 29 409) and GORDON DAVEY and PEASTON ((1934) 1935 32, 237).

For *Cercaria mansoni* the numbers given are five a side by KHALIL ((1922) 1923 20, 220) VOGEL (1932, 29 409) ARCHIBALD and MARSHALL ((1932) 1933 30, 210) and GORDON DAVEY and PEASTON ((1934) 1935 32, 237) and six a side by FAUST ((1920) 1921 17 55) CAWSTON ((1922) 1923 20, 941) and FAUST HOFFMAN and JONES (1934 31 776).

For *Cercaria japonica* all workers give five a side COOT ((1919) 1921 18, 106) CAWSTON ((1922) 1923 20, 941) TAKAHASHI (1928, 26 950) and VOGEL (1932, 29 409).

Two points are then clear. Attempts to say with our present knowledge, that cercariae coming from a mollusc are those of a certain species of schistosome, and that that mollusc is the larval host of that species are of no value. Secondly statements of this sort which have been made have to be put on one side. The decision to which we are forced is that at present only *S. haematoebium*, *S. japonicum* and *S. mansoni* do in fact come into the picture of schistosomiasis in man.

THE FAR EAST

Schistosoma japonicum Katsurada, 1914.

Japan.—In the opinion of LEIFER and ARTHURSON (1915 6, 296) the larval host in Japan was *Ketayewa nasophora* n. g. n. sp Robson 1915^a Robson having named it in an addition to the paper but saying that the name of the genus might have to be changed, the condition of his material being poor. The steps taken in proof that this mollusc was larval host were not the best because the animals which were used were not of laboratory growth (with the War work had to be stopped suddenly). But on the other hand the very strong attraction which these animals had for the miracidia was present in no other species which was tested, and the cercariae which came naturally from *K. nasophora* became worms of full development in animals. So the writers were in no doubt that the development of the worm was as they said, and with that view there has been a full agreement.

China.—The work of FAUST and MELLEROY ((1924) 1925 23, 468) was done round the Yangtze River. Near Soochow was seen a mollusc like *K. nasophora* and when 240 were crushed there came from seven of them fork tailed cercariae which gave to *M. swinhonis* infection with *S. japonicum*. For the miracidia these molluscs had a great attraction 23 of them were still living on the 80th day of the test 10 had the infection cercariae from two of them underwent growth in *M. swinhonis* so

^a The same molluscs have been given different names by different writers. It seems best to give in the body of this paper the names which were used in the papers themselves and in footnotes those which now seem valid.

that 70 days later this was harbouring worms of full development. Bryant Walker of Detroit put the molluscs in the species *Oncomelania hupensis* Gredler 1881. About Kashing there were in thousands molluscs which Faust and Melanes put in the same species and whose attraction for miracidia was great. About Shaoxing were others put by Nelson Arnandale of Calcutta in the species *A. nosophora* and these writers had the same opinion about those they saw at the mouth of the Upper Pearl River fifteen miles west of Canton all of them being free from infection.

Korea — No case of infection had come to the knowledge of KOSEI ASHI (1925 22, 453).

Formosa — *A. nosophora* is not present (Mendoza-Guzon). *Blanfordia formosana* is the larval host. (BEQUAERT (1934) 1935 32, 246)

Philippines — In the view of TUBANCUI ((1932) 1933 30 210) the larval host is a mollusc identified as *Blanfordia quadrasi*? (= *Prosobranchia quadrasi* Möllendorf) by Dr J. Bequaert of Harvard University.

All molluscs of this group are long and narrow and have an operculum. They are not water livers but when put in it come up and out of it and it is while they are so doing that they are attacked by the cercariae swimming in the upper parts. When the top of the earth to which this journey has taken them becomes dry, they go down through it to wetter parts and by doing so and by the shutting of the operculum they may be still living almost three months later COX ((1919) 1921 17 59) though the time was shorter in those in which infection had first taken place. Because they are not true water animals it is not possible to put them to death by any amount of care in chemical treatment of waterways.

MEDITERRANEAN BASIN

Egypt — *S. haematobium* — Here LEIPER first gave clear proof (1916 7, 347 and 8, 509) that *S. haematobium* and *S. mansoni* are separate species that their carriage is by different molluscs and that for *S. haematobium* the larval hosts are *Bullinus contortus** Michaud 1829

*SYNONYMY OF THESE MOLLUSCS (see BEQUAERT (1934) 1935 32, 246). In the view of no authority is *Asteleya* now a good name for the genus. *Prostomia* Neumayr 1889 was used for fossil amnicolid molluscs from Pliocene beds of S.E. Europe and Pilbry's belief is that no Oriental mollusc now living has a place in this genus. *Hemibis* Heude 1889 was put forward without genotype in place of *Oncomelania* because this name seemed "inappropriate." Under the International Code of Zoological Nomenclature the change of an earlier name for this reason may not be made so Bequaert made *Asperisus* the type species of *Hemibis* and because it had before this been the type of *Oncomelania* the name *Hemibis* becomes twice "invalid" as a synonym. *Hyprobis* Heude 1890 "differs from *Blanfordia* and *Oncomelania* in multidentate marginal teeth of the radula. Quite possibly it is generically distinct, but none of the snails thus far known as hosts of blood flukes can be referred to it," though the species *nosophora* had in fact been put in this genus. There are two names for the genus, *Blanfordia* and *Oncomelania* which may possibly be given to this group. Bequaert's view of them is this. "It would seem that the smooth-shelled Oriental Amnicolidae known to act as intermediate hosts of the blood fluke *Schistosoma japonicum* such as *nosophora* Robson, *formosana* Pilbry and Hirase and *quadrasi* Möllendorf should be placed in the genus *Blanfordia*. The ribbed shelled species *Asperisus* Gredler may be left in *Oncomelania* if one wishes to retain that name in a generic or sub-generic sense." A medical man has, then, good authority for making use of the name *Blanfordia* for all four species.

B. dybowskii Fischer 1891 and *B. issaces* Bourguignat.⁸ His observation like that of Hamilton FAIRLEY and BAHR (Observations on Egyptian Bilharziasis, Part I. Commonwealth of Australia, Department of Defence) was that the colour of normal Bulinus is green-black to brown, but that the apical convolutions, as seen through the shell of molluscs which have the infection are yellow. By LEIPER (1918 12, 164) the point was made that molluscs were present in the great and small waterways coming from the Nile, and in the small stretches of water named birkets near groups of houses, while FAIRLEY's view ((1933) 1934 31 383) is that these molluscs come to Egypt every year at the time of high Nile on the plant *Potamogeton crispus* from the Sudan and places south of this. In the experience of MAXSON BAHR and Hamilton FAIRLEY (1920 18, 131) the infection rate of these molluscs in birkets was greatest in December and in their belief oviposition took place in July and August. For the destruction of molluscs by physical methods LEIPER's reading of the facts (1923 20, 862) was that in Egypt control of the disease might be got by the use of

"rotations" in irrigation the outcome of which would be the death of *Bulimus*⁹ in great numbers, as the result of drying. But that this is not the necessary outcome is seen from BARLOW's field work (1933 30, 674) because on drying *Bulinus* molluscs take up a position with the shell-opening facing down while their excretion of an epiphragm of slime makes their drying up even more uncertain. In the end, 50 per cent. of them came living through his tests all of these being then free from infection. In further tests BARLOW (1935 Amer Jl. Hyg 22, 376) found there was 40 times as much *Bulimus*⁹ infection in September before the drying as in January after it. That loss was possibly as in Cort's experience with *Blanfordia* caused in part by more ready death of molluscs which had infection but certainly in part by death of the larval worms in them. It is clear that Leiper's suggestion as to the good "rotations" do in limiting this infection is only made stronger by the knowledge that their effect is in fact greatest on molluscs which have infection or on the parasites in them. As Barlow says, death takes place in mollusc's eggs on drying. Death of cercariae takes place straight away in chlorinated lime 1 in 30 000 and in a feeble solution of ammonium sulphate ($(NH_4)_2SO_4$) (LEIPER, 1915 6, 437). CHANDLER's experience having been ((1920) 1922, 19, 209) that after 48 hours in copper sulphate ($CuSO_4$) 1 in 1 000,000 there was death of eight species of molluscs from six genera. KHALIL ((1927) 1928, 23, 436) made an addition of this salt for four days and nights without stopping, to the chief stream in the Dakhla Oasis. The outcome was the death of all *Bulinus* molluscs, and no living one was to be seen six months later. The strength at which the solution was kept may be taken as five parts to a million (KHALIL (1929) 1930 27 366) and in this second paper this observation had gone on for ten months without the discovery of any living molluscs. This parasite is present, in addition in the Baharia Oasis, but not in those of Siwa or Gara, with

⁸ From the account of Baylis ((1831) 1832 29, 409) the valid generic name is *Bulinus* Miller 1781 not *Bulimus* Oken 1815. He makes *B. costifer*, *B. dybowskii* and *B. issaces* synonymous of *B. truncatus* (Andreae 1826). Khalil in fact comes to the same opinion (Discussion, Arkin, 1935 32, 622) in saying "Bulinus snails have been caused to change from one species to another and to give rise to intermediate species by cross breeding." As sub-genera of *Planorbis* with their species Baylis gives *Planorbis dybowksi*, *P. boissyi* and *P. pfeifferi* and *Planorbis striatus*, *P. grandis*, *P. antithetica* and *P. antiquata*.

their strongly salt water (KHALIL (1933) 1934 31, 327). In the Nag Hamadi area of Qena Province (Upper Egypt) only urinary infection seems to be present with *Bulinus*⁴ in numbers but no *Planorbis*. In Alexandria the two infections and the two genera of molluscs are present (ABAZA (1929) 1930 27 437).

S. mansoni—LEIPER gave proof (1916 8, 509) that the larval host of *S. mansoni* was *Planorbis boissyi* Potiez and Michaud 1838 *P. laevigatus* Bourguignat from Lake Timsah and the wet lands near Ismailia being seemingly a synonym. It is present in small waterways drains and wet lands. In BARLOW's work (1933 30 674) 84 per cent. of *P. boissyi* were still living after drying for 30 days and this they did by going back into the shell where they were shut in by an epiphysis of slime and in his second paper it is noted that infection in them was 20 times as great before drying in rotations as after. But here again, death of eggs took place quickly on drying (KHALIL, 1922, 19 649). In Rodah Island opposite Cairo there is no *Planorbis* or *S. mansoni* (EL BATASH 1929 28 971).

Palestine.—*B. concretus* and *S. haematobium* were first noted in this Bulletin in 1918 at Malebbis a Jewish colony near Jaffa, in cisterns and a deep well (SEARLE (1920) 1921 17 55) while BUXTON and KRIKORIAN ((1922) 1923 20 212) got cercariae from 6 of 64 of these molluscs there. FELIX (1925 22, 464) said that there was infection in this place long before the War and made the discovery that 4.3 per cent. of 1,256 boys and girls certainly had the infection. In 2,400 faeces *S. mansoni* eggs were present in two cases which had possibly come from some other place, because *Planorbis boissyi* had not so far been seen in Palestine. Discovery of two such infections was made in the Tel-Aviv laboratory the persons came from Yemen Arabia and this statement is made—"There is no authentic case of intestinal schistosomiasis having been contracted in Palestine" (1932, 29 Suppl. 68*). On the other hand *S. mansoni* was seen in two men in Australia about whom the belief was that they had got it near Jaffa (FAIRLEY and FAIRLEY (1929) 1930 27, 454).

Syria.—There is a first record of *S. haematobium* in the State of Damascus. POUYF and SABAGH ((1922) 1923 20, 213).

Cyprus.—Infection with *S. haematobium* has been seen for years in Syrianokhon and *B. concretus* is present (1932, 29 Suppl. 73*). LEIPER had made the observation earlier that the distributions of the mollusc and the infection were the same (1923 25 948). It has got as far as Morphou (1933 30 Suppl. 112*) but no further (1934 31, Suppl. 99*).

Corsica.—*B. concretus* is present (BRUMPT and WERBLINSKY 1928 25, 458) and its infection by *S. haematobium* has been effected in the laboratory and in over 6 per cent. of Senegalese there and in the South of France the infection is present (BERNARD 1928 25 948). No later statement has come to light, though BRUMPT* (in France) has readily given this infection to the hedgehog (*Erinaceus europaeus*).

Portugal.—The discovery of endemic infection with *S. haematobium* in Algarve was made by BETTIENCOURT BORGES and DE SEABRA ((1921) 1922, 19 206). Their belief that the larval host was *Planorbis metidjensis* was based on their getting from them fork-tailed cercariae

* Ann Parasit hum et comp 1930 8, 17-50

very like if not the same in structure as, those of *S. haematobium*. FRANÇA and DR MELLO ((1921) 1923 20, 216) gave support to this in their statement that this mollusc has a marked attraction for cercariae, and BETTERCOURT and BOECKS gave proof by the infection of mice (*Mus musculus*) with discovery three months later of *S. haematobium* in the portal vein system ((1922) 1923 20, 218). BETTERCOURT and FIGUEIRA (1923 20 621) give an account of schistosomiasis at Alportel, Algarve with *Planorbis dybowskii* present in the water. This in PALLARY's view is the same mollusc as *P. mediterraneus* but in FRANÇA's ((1922) 1923 20, 621) the two are somewhat different.

Morocco.—BRUMPT ((1922) 1923 20, 213) makes comparison between Marrakesh where *B. contortus* is very common and bilharziads is not common and Gafsa in Tunis where the conditions are the opposite but in the experience of CARROSSE ((1930) 1931 28, 188) cercocercariae came out of 5 or 8 per cent. of *B. contortus* in Marrakesh but not out of *P. mediterraneus* of which there are quite a number. In Tangier there are *B. contortus* and *P. dybowskii* but no schistosomiasis (CHARRIER (1923) 1924 21 188). The infection is present at Erfoud (VIALATTE (1932) 1933 20, 209).

Algeria.—The number of *Bulinus* molluscs is becoming less, acid waters are not harbourers of them, and they are not present in the newly formed En Naro Marsh (PALLARY (1934) 1935 32, 243). The great size of Lake Onbeira makes treatment to get it clear of molluscs impossible (GAUTHIER (1934) 1935 32, 243). The only centre of *S. haematobium* infection now is the Oasis of Djant near Tripoli, 24° N., where it is present in *B. contortus*, *B. dybowskii*, *B. brocchii* and *B. annexi* (see further RAYNAUD (1929) 1927 24 515).

Tunis.—The distribution of *Bulinus* is wide and that of *B. contortus*, *B. dybowskii* and *B. brocchii* is the same as that of *S. haematobium*. *Planorbis philippinensis subengelhardti* is limited to the country between 37°21' N. and 36°33' N. *S. mansoni* has not been seen (ANDERSON (1922) 1923 20, 619). In the warm springs of Gafsa there are no larval schistosome hosts, the temperature above which they are not present is 25°C. (GOBERT (1934) 1935 32, 243). *B. brocchii* in irrigation canals is probably the wrong-doer (LACROIX 1924 21, 544). A variety of this species was given infection with *S. haematobium*, the death of all molluscs took place, but sporocysts were present in 1 of 20 (ANDERSON and DR LAGOANTONI 1927 24 515).

Tripoli and Cyrenaica.—In the tableland 620 metres higher than the sea there is no schistosomiasis and nowhere is there *S. mansoni*. *Planorbis aethiops* is present. Near Derna *Bulinus* is common and two cases of *S. haematobium* were seen by PATANI ((1924) 1925 22, 484) but the infection is endemic (ZAVATTARI 1932, 29 409) 1·4 per cent. of 606 young persons being the measure of its amount (VIGLIETTA (1934) 1935 32, 243). The belief of RIZZO (1927 24, 987) was that he had seen the first case of *S. mansoni* infection got in the country. There is a small endemic area of urinary schistosomiasis in Tawarga near Misurata but the only mollusc seen was *Planorbis boissyi libica* no proof of any connexion between the two was attempted (PENSO 1934 31 383). In Fezzan *S. haematobium* was seen in from 60 to 80 per cent. of boys in some places, but its distribution and that of *Bulinus* seem to be unequal (ZAVATTARI 1934 31 773).

THE REST OF AFRICA.

The Sudan—Before the start of a watering system in the Gezira Province in 1925 made possible by the building of the Sennar Dam across the Blue Nile there was almost no infection with *S haematoalbum* (HUMPHREYS (1932) 1933 30, 207). In two years *Bulinus* species named as being almost all *B truncatus* with some *B forskali* were present in all waterways of the system and in three years *Planorbis* species in addition (*P alexandrinus*¹⁰ and *P pfeifferi*) after the drying of the waterways and the treatment with a carbolic acid on the market under the name *sizolm* of the hollows which did not get dry no living molluscs were seen and the infection rate became a quarter to a sixth of what it had been. In the White Nile Province infection is by *S mansoni* ((1931) 1933 30, Suppl. 99*) The molluscs are named by ARCHIBALD ((1933) 1934 31, 112) as being *B truncatus* (covering *B contortus* *B dybowski* and *B innesi*) and *Planorbis boissyi* *P pfeifferi* *P alexandrinus* and *P herbini*¹¹ and he makes the statement that they are capable of aestivation in the subsoil for 3 to 4 months and so represent the seed stock of the following rainy season. Again ARCHIBALD's statement is ((1933) 1934 31, 114) that fruit of the tree *Balanites aegyptiaca* by reason of a saponin is the cause of the quick death of all molluscs when 35 berries are put in 30 litres of water.

Eritrea Ethiopia French Somaliland and British Somaliland—No accounts have come to light.

Italian Somaliland—There is infection with *S haematoalbum* in 30 per cent. of persons who have been there from birth. An *Ampullaria* but no *Bulinus* species was seen (VEVERONI (1926) 1927 24, 515).

Uganda—The only public notes seem to be those in the Government Medical and Sanitary Reports. It seems that there is knowledge of schistosomiasis only near the Albert Nile and no knowledge of the larval hosts of the worms.

Kenya and Tanganyika—*S haematoalbum* and *S mansoni* are present. No statement as to larval hosts has come to light.

Zanzibar—The suggestion of CAWSTON (1927 24, 987) is that *Physopsis ovoidea* limited to Zanzibar may be a species and not a variety of *Ph africana*¹² and may be the larval host here of *S haematoalbum* a suggestion with which MANSFIELD-ADERS ((1929) 1930 27, 943) is in agreement but which it seems has not been put to the test.

¹⁰ In the opinion of Major Connolly *P alexandrinus* is a synonym of *P boissyi*

¹¹ The valid name is *herbini* as Connolly has said.

¹² Connolly's view ((1934) 1935 32, 241) using for the most part his own words, is that between *Physopsis africana* Kraatz, 1848 and *Physopsis globosa* Morelet 1888 the only real difference is that the second has a slight rimation which is only fairly constant. [In other words on the method of grouping used here, the valid name will be *Physopsis africana*] South of Egypt the oldest name applied to those molluscs of the genus *Planorbis* which are nearly alike is *Pl pfeifferi* Kraatz, 1848. It is seen in the greater part of the continent south of the Kunene and Zambezi rivers, but Connolly has noted typical shells from Northern Rhodesia and Kenya. Other specific names which have been used are *Pl stilesii* Smith, 1888 and its synonym, *Pl bridouri* Bourguignat when molluscs from Kaballa were sent to Louis Germain of Paris his view was that "your *Planorbis* from Sierra Leone is evidently near to *pfeifferi* Kra. but still more so to the forms from L. Chad or *bridouri* Bkt., and it seems more suitable to classify it as that species" (CONNOLLY (1934) 1935 32, 241) In other words the expert

Nyassaland.—Judging by attraction of cercariae to molluscs, *Physopsis globosa* is probably the larval host of *S. haematobium* and a *Planorbis* species for *S. mansoni* (CHRISTOPHERSON (1923) 1924 21 188). The only mollusc from which fork tailed cercariae came was *Melaniae tuberculata*. It is not seen from July to September and at that time no new cases of infection with one or the other of these parasites came to hand so that the suggestion is made that it is larval host for the two schistosome species (GORSKI (1930) 1931 28, 188).

Portuguese East Africa.—The two worms are present (PERRET GENTIL, 1933 30 675).

Madagascar.—For long only *S. mansoni* has been noted (GIRARD (1920) 1922, 18 200) infection being greatest in the South Plateau (55.3 per cent. in 170 examples of faeces RAYNAL (1929) 1930 27 463) but LUTROT (1935 32, 624) has now seen the eggs of *S. haematobium* in Tsimpiha and Anjijobe in those who have not been away from the island. No work seems to have been done on molluscs.

Mauritius.—*S. haematobium* is present. The larval host has at least been made clear by ADAMS (1934 31 774) in *Bulinus forskali* which has a great attraction for miracidia and readily undergoes infection. Animal tests were undertaken but without development of worms, possibly the suggestion was, because the numbers of cercariae used were small (A. R. D. ADAMS 1935 Ann Rep Bacteriol. Lab Mauritius for 1934)—a right suggestion, because when ADAMS put *M. sphaeroides* for 24 hours in all, in the way of infection by all cercariae coming freely from about 24 *B. forskali*, it got a strong infection with worms which had in all chief details the structure of *S. haematobium* (Annals Trop Med & Parasit 1935 29 255).

Sri Lanka.—*S. haematobium* is present at levels under 3,000 ft. (1931 30 Suppl. 88*) and cases of persons coming to hospital are increasing ((1932) 1934 31 Suppl. 76*).

Afghanistan.—The knowledge got from the reading of the papers on this question is not equal to their size and number. Some decisions are based on belief that the species of schistosome may be named from the structure of the cercaria. In *Physopsis africana* from water which had been noted as having the infections, sporocysts were seen which had fork tailed cercariae inside them (CAWSTROX (1915) 1916 7 348). An account of the growth of the worm to full development in test animals of cercariae from *Pk. africana* is given by PORTER (1920 16, 131). *Pk. africana* of laboratory growth was given infection with miracidia of *S. haematobium* 35 days later cercariae came away (CAWSTROX (1922) 1923 20, 216) but *Lymnaea natalensis* gave no sign of infection and he has made the discovery that the molluscs are undamaged by drying long enough to be sent by post (1927 24 896) and may still be living after thirty days in earth (1929 28, 790).

Cape Province Orange Free State Province Transvaal Basutoland and S.W. Africa.—No paper upon schistosomiasis has been come across in this Bulletin.

was not ready to put the examples certainly in one species or the other. Connolly's suggestion [private letter] about near species is that while it would be conchologically incorrect to refer to either of them under the name of the other, the use by medical men of such words as "Planorbis of the *pfeifferi* group (or type)" and "Physopsis of the *africana* group (or type)" would give to other medical workers enough detailed knowledge for their purpose, a suggestion which seems to the reviewer to be wise and to the point. For this and other suggestions on this subject the writer is very much in Major Connolly's debt.

Betehuanaland—*S. haematobium* is present (1933 30, Suppl. 86*)

Southern Rhodesia—In the work of BLACKIE (1932 29, 401) cercariae were got from natural infections of *Phys. globosa* but infection of *Planorbis pfeifferi* was produced in the laboratory from miracidia of *S. mansoni*. These cercariae came to full growth in guineapig (*Holochilomys brasiliensis*) and rabbit (*Lepus cuniculus*) and in this way proof was got that here the larval host of *S. mansoni* is *Planorbis pfeifferi* and of *S. haematobium* is *Physopsis globosa*. In the small grey monkey of the country *Cercopithecus pygerythrus* *S. mansoni* went to full growth, so this may be a natural host as *C. sabaeus* is on St. Kitts. *Plan. pfeifferi* has a narrower distribution in the Colony than has *Phys. globosa*.

Northern Rhodesia—Schistosomiasis is reported from most stations the subject calls for investigation at an early date (1934 31, Suppl. 71*)

Angola—No paper has been seen.

Belgian Congo—The two infections are present in addition to that noted under *S. intercalatum* but outside this there seems to have been no work on mollusca as hosts other than a list of them by VAN DEN BERGHE ((1934) 1935 32, 242) in which are *Planorbis adamsensis* and *endanicae*, *Physopsis africana* and *Bulinus forskali*.

French Equatorial Africa—The chief seat is at Tchad (LEFROU (1923) 1926 23, 747). At Dakar 601 19 cases of intestinal schistosomiasis were caused by *S. haematobium* and 1 of 140 of vesical infection by *S. mansoni*; there are *B. concolor* and *B. striatus* at Medina (Upper Senegal) and no *Planorbis boissyi* but 16 other species (LEGER (1923) 1927 24 514).

Nigeria—The two infections are present. *Physopsis globosa* is frequent in small stretches of water in hano (GORDON 1932 29, 409). At lagoro infection took place by *S. mansoni* of Europeans after bathing in water having a connexion with a place where there were *Plan. pfeifferi* and *Plan. stanleyi* some of the molluscs having infection with fork tailed cercariae (TAYLOR 1932 29, 742).

Gold Coast—The two infections are present but do not seem to have been noted in print outside government papers.

Liberia and French Guinea—Infection is with *S. mansoni* and from *Planorbis choanostrophalus* came fork tailed cercariae which went into the skin of man (MAASS and VOGEL (1930) 1931 28, 184). But *Plan. pfeifferi* has a strong attraction for miracidia of *S. mansoni* and the cercariae from it have come to full development in monkeys (VOGEL, 1932 29 409); his suggestion is that as in Sierra Leone *Physopsis globosa* may here be the larval host of *S. haematobium*.

Sierra Leone—The work of GORDON, DAVEN and PEASTOV ((1934) 1935 32, 237) has made it clear on the lines which have been noted earlier (p. 2) as necessary for safe decisions that *S. mansoni* has here *Plan. pfeifferi* as larval host and *S. haematobium* has *Phys. globosa*.

Senegal—The two species of schistosomes are present. The list of mollusca given has in it *Bulinus concolor* and *B. striatus* and though there is no *Planorbis boissyi* there are said to be sixteen other species among them *P. bridouxii* and *P. salinarum* (LEGER 1923 20, 619). LEFROU ((1933) 1934 31, 115) gives in addition *B. dybowskii*.

THE REST OF ASIA.

Arabia.—In the laboratory at Aden was seen one case of *S. haematochasmus* and one of *S. mansoni* in men who had not been across the sea at all (GREVAL 1923 20, 821). There is knowledge that *S. mansoni* is present at Yemen (MALCHI 1924 1925 22, 888).

Damascus.—*S. haematochasmus* was seen in a Syrian who had never been away from Damascus (POINX and ABDEL KADER SARRACH 1923 1924 21, 205).

Iraq.—It was hard for BOULENGER ((1919) 1920 18, 134) to put into agreement the great number of cases of infection with *S. haematochasmus* in the Arabs with the small number of *Bulinus* mollusca. Cleaning water plants and putting a stop to watering of the land for 14 days every three months made their numbers less (HALL (1925) 1926 23, 244). A detailed account of their morphology was given by ANNANDALE (1919 18, 200).

India.—A footnote by Leiper at the end of an outline account of a discussion on the reason why this infection is not got in India is to the point. The absence of the mollusc genus *Bulinus* from the Indian fauna may indicate an alternative explanation to that put forward in this paper (NIXON 1919 14, 141).

Cochin China.—In the same way men harbouring *S. haematochasmus* and *S. mansoni* have come freely into Cochin China but without handing on the infection to others.

AMERICA.

The only schistosome of man which has larval hosts in America is *S. mansoni*.

Venezuela.—The work of ITURBE and GONZALEZ made it clear in 1917 (10, 114) that *Planorbis guadalupensis*² is the larval host, because among all the molluscs which were tested it was in this one only that infection was readily got; it took place in almost every mollusc of this species which was used by them, it went on to the stage of cercariae, and the cercariae came to full development in *Mus musculus*. Quiet river water and canals are its normal habitats (ITURBE (1924) 1925 22, 467). In an outskirt of Caracas there was still infection of 25 per cent of these molluscs nine years later (HILL and TEJERA (1933) 1934 31 380).

Porto Rico.—FAUST HORNMAN and JONES (1934 31, 776) went over the same field as Iturbe and Gonzales with like results the snail being *Planorbis guadalupensis* and growth to the stage of full development taking place in *ratu*. In canals about Guayama 8 per cent. of these molluscs had a natural infection.

St. Kitts.—CAMERON made the important discovery that African monkeys on this island had infection with *S. mansoni* ((1928) 1929

² In the abstract of a paper by FAUST & HORNMAN ((1934) 1935 22, 249) are these words "Planorbis spars stricto applies only to European species, the American forms belong to *Hednota* Swainson, 1840. But *Hednota* has been divided into several subgenera, of which *Planorbis* Dall, 1908, contained *guadalupensis*. But the subgeneric name *Planorbis* was preoccupied by Haldeman in 1842 so cannot be used for this group and was therefore superseded by Paliby in 1934 by the name *Australorbis* which is held to require full generic rank, with *guadalupensis* as type." The name *guadalupensis* Say 1818 has priority of *guadalupensis* Sowerby 1821 for the species.

26, 533) and gave a demonstration that the larval host was *Planorbis guadaloupensis* ((1929) 1930 27, 267).

French St Martin—In the opinion of JONES ((1923) 1924 21, 201) the larval host seems to be *Planorbis antiquensis*.

U.S.A.—The case noted in Illinois (SULLIVAN 1932 29, 741) with a number of worms of full development in the urine may not rightly be listed as one of schistosomiasis.

Cuba—There is no *S. mansoni* infection and no *Planorbis guadaloupensis* (HOFFMANN (1922) 1923 20, 219).

Central America—There is no schistosomiasis (RISQUEZ (1921) 1922 19, 201).

Dutch Guiana—The work of Leiper and those working with him made it clear that *S. mansoni* was endemic in Paramaribo that *Planorbis olivaceus* was present in rice fields on its outskirts and in roadside waterways in it 5 per cent of them in the town having infection (KHALIL and LEE (1921) 1923 20, 940).

French Guiana—LARERNADIE and MARNEFFE ((1929) 1930 27, 441) saw eggs of *S. mansoni* in 65 of thousands of samples of faeces at Cayenne and all of these persons had been outside the country.

Brazil—In tests by LUTZ *Planorbis olivaceus* Spix gave full development to the stage of cercariae of the miracidium of *S. mansoni* while in *Plan. ferrugineus* Spix and *Plan. tenagophilus* d'Orb infection took place but development did not go as far as the cercaria ((1916) 1917 9, 271). In animals cercariae went to full development in the mesenteric veins in five to six weeks. *P. olivaceus* has not been seen south of Bahia ((1917) 1918 11, 78). In the view of CHRISTOPHERSON (1923 20 941) the molluscs sent him by Lutz were *Planorbis olivaceus* and *Plan. centimetalis* Lutz 1918¹⁴ the second from North Brazil. In Sergipe *Plan. centimetalis* was in the belief of CARDOSO ((1923) 1924 21, 199) the common larval host. In places in Paraíba this mollusc is present in numbers and almost all of them have the infection. This is quickly becoming wider and the molluscs in question are *Plan. olivaceus*, *P. guadaloupensis* and *P. centimetalis*. In tests by Lutz this last is certainly a larval host because there has been development of cercariae and from these infection of white mice by worms of full development (LUTZ 1934 31, 779). It may be overlooked among the much greater *P. olivaceus*.

AUSTRALIA.

FAIRLEY and FAIRLEY ((1929) 1930 27 454) make note that NELSON ((1912) 1913 1, 426) had seen three cases in Western Australia but that Cherry had been able to give infection to no molluscs of the genera *Bullinus*, *Ancylus* and *Planorbis*. There is no need to put in the list of infections the case of HOLLAND and WOODWARD ((1924) 1925 28, 465) of a boy of three who had been in the same house in New South Wales from birth and whose urine had eggs twice or three times as large as the typical ones spherical, the clear capsule much thicker the spine missing.

¹⁴ The specific name as it is used by some writers is *centimetalis* by others *centrometalis*. As given to it by Lutz ((1918) 1919 14 142) it was *centimetalis* equally in the Portuguese and English accounts, and that is the valid name.

KALA AZAR.

FOREYER (C. E.) & ZIA (Lily S.) An Outline of the Development of the Theories for the Transmission of Leishmania together with Further Evidence to support a Theory of Direct Transmission of Kala-Azar through the Agency of Oral and Nasal Secretions.—Far Eastern Assoc. Trop. Med. Trans. Ninth Congress, Nanking, China 1934 Vol. I pp. 633-654 With 4 figs. on 1 plate. [129 refs.]

NAPIER (L. Everard) The Transmission of Kala-Azar in India.—*Ibid.* pp. 657-665.

ZIA (Lily S.) & FOREYER (Claude E.) Acute Agranulocytosis—a Previously Unrecognized and Important Complication of Kala-Azar.—*Ibid.* pp. 667-678. With 7 figs. [18 refs.]

ANDREWS (Mary N.) A Case of Canine Kala-Azar occurring in China.—*Ibid.* pp. 679-681 With 2 plates.

The first paper in this series is by FOREYER and ZIA and discusses the possibility of direct transmission of kala azar through the agency of oral and nasal secretions in which they have demonstrated viable leishmania. It is very largely the same as other papers on the same subject by these authors, reviewed in this *Bulletin* 1934 Vol. 31 p. 658 and 1935 Vol. 32 p. 479. The second paper is by NAPIER, on the subject of transmission of kala azar in India by *Phlebotomus argentipes*. It is in many ways a reply to the first paper and embraces views expressed by the author in a paper reviewed in this *Bulletin* 1932, Vol. 29 p. 106. The third paper by ZIA and FOREYER describes acute agranulocytosis in kala azar a subject already dealt with by them (this *Bulletin* 1935 Vol. 32, p. 482). The fourth paper by Mary N. ANDREWS, records the case of a dog which had a generalized leishmania infection. The dog in question was born in Mukden in 1928 and was brought to Shanghai in 1929 when it appeared to be in good health. In 1931 general enlargement of the glands commenced. In May 1932 the dog was losing ground and was destroyed in July of that year. The only tissues kept for examination were the glands and spleen and in sections of these heavy leishmania infections were found. It seems probable that the infection was contracted in Mukden, an endemic centre of kala azar rather than in Shanghai where the disease is not known to occur. This is the first record of kala azar in a dog in China.

C. M. Werryon.

SHOOTT (H. E.) & SWADESHI (C. S.) The Presence of *Leishmania donovani* in the Nasal Secretion of Cases of Indian Kala-Azar.—Indian Jl. Med. Res. 1936. Oct. Vol. 23 No. 2 pp. 437-439 With 2 figs. on 1 plate.

In view of the work of FOREYER and ZIA on cases of kala azar in North China and their discovery that leishmania occur quite commonly in the nasal secretions the authors have examined from this point of view four cases of this disease in India. In two of these leishmania were found in smears of the nasal mucus which had been taken on the type of probe used for routine nose and throat examinations. The parasites were quite normal in appearance, so that it is probable they are viable, as has been proved in the Chinese cases.

C. M. W.

GRITTI (Paolo) Sulla presenza di Leishmania nel rinofaringe dei bambini affetti da leishmaniosi. [Leishmania in the Nasopharynx of Children suffering from Kala Azar]—*Pediatra* 1935 May 1 Vol. 43 No 5 pp 562-567 With 2 figs. English summary (5 lines)

In the adenoid tissue of the rhino-pharyngeal region of three cases of kala azar the author has demonstrated the presence of leishmania. The conclusion is that the lymphoid tissues of Waldeyer's ring form a suitable medium for the development of the parasites of kala azar

C M W

SHORTT (H. E.) SINTON (J. A.) & SWAMIATH (C. S.) The Probable Vector of Oriental Sore in the Punjab—*Indian Jl Med Res* 1935 July Vol. 23. No 1 pp 271-278. With 1 fig

That *Phlebotomus sergenti* was the probable vector of oriental sore in India was pointed out by SINTON (1922-27) in his studies on the distribution of sandflies. Later ADLER and THEODOR studied this sandfly in Baghdad and obtained development of *Leishmania tropica* in its alimentary canal. In one case a volunteer inoculated with flagellates from an experimentally infected sandfly developed an oriental sore. Out of 683 *P. sergenti* dissected in Baghdad two were found naturally infected. As many of these feeding and inoculation experiments had been carried out with caught flies the author decided to repeat the work with laboratory bred flies. Thus he has successfully done and has shown that *Leishmania tropica* develops into flagellates in the alimentary tract of these sandflies after feeding on oriental sores. A *Macacus rhesus* inoculated into the skin by scarification with flagellates from a sandfly fed 5 days before on a sore developed a lesion in which leishmania were demonstrated. It would appear that the Punjab strain of *L. tropica* develops in *P. sergenti* in a manner indicating a definite host parasite relationship

C M W

KHALIL Bey (M.) [Opened by] A Discussion on Leishmaniasis in Egypt.—*Jl Egyptian Med Assoc* 1935 Apr Vol. 18. No 4 pp 203-206

The discussion related to the endemic focus of oriental sore which had recently come to light near Zagazig to the East of the Nile Delta (this *Bulletin* 1935 Vol. 32 pp 81 & 89)

C M W

PAPANTONARIS (Evangelos) Observations on Leishmaniasis in the District of Canea (Crete)—*Ann Trop Med & Parasit* 1935 July 17 Vol. 29 No 2 pp 191-197 With 3 graphs & 1 plan.

The paper describes kala azar and oriental sore in the district of Canea in Crete the first case from which was described by ARCHER in a British soldier in 1907. It is probable that at least 50 cases of kala azar occur in the district each year and these have the usual characters of the Mediterranean disease. Two centres Hagios Ioannis and Koun-Kapi which are relatively newly built quarters 1 kilometre and 350 metres respectively from the old town are the endemic foci of kala azar which is quite absent from the old town. On the other

(1975)

hand the old town is the endemic focus of oriental sore. This difference in distribution of the two diseases corresponds with the distribution of the sandflies responsible for transmission.

C M W

BULLETIN DE L'OFFICE INTERNATIONAL D'HYGIENE PUBLIQUE. 1935. Mar Vol 27 No. 3 pp. 519-549 La leishmaniose viscérale dans les pays méditerranéens [Kala Azar in the Mediterranean Littoral and Elsewhere] I. La leishmaniose viscérale dans les colonies britanniques du bassin méditerranéen [STANTON (A. Thomas) pp. 519-524]. II. La leishmaniose en Italie [LETTRARIO (A.) pp. 525-532]. III. La leishmaniose viscérale au Maroc [GAUD (M.) pp. 533-535]. IV. La leishmaniose au Portugal [JORGE (Ricardo) pp. 538-543 With 2 maps] V. La leishmaniose viscérale humaine en Tunisie [ANDERSON (Ch.) pp. 544-547 With 1 map] VI. La leishmaniose canine en Egypte [CARPANO (M.) pp. 548-549]. CORAXARIS (Ph.). La leishmaniose viscérale en Grèce.—Bull. Office International d'Hyg. Publique 1935 Aug Vol 27 No. 8 pp. 1570-1574

These papers are answers to the questionnaire sent out to the countries mentioned in the title and are a continuation of the series noted in this *Bulletin* 1935 Vol. 32, p. 81. Little new information beyond that already noticed in published papers reviewed in this *Bulletin* is given.

C M W

MARCHESI (F.) CRAZZI (F.) & SCAPARICCI (R.) Investigations on the Seasonal Variations of Canine Leishmaniasis in Rome.—Jl. Trop. Med. & Hyg. 1935 Sept 18. Vol. 38 No. 18. pp. 228-229. With 1 chart. 43 refs.]

The authors discuss the problem of leishmaniasis in Rome, an investigation into which has been in progress. It appears that both the visceral and the cutaneous diseases may be contracted in this city while one case of the mucocutaneous form has been recorded. The reservoir of the visceral disease appears to be the dog, for the examination of 881 destroyed dogs during 1934 revealed leishmania infection in 18. During the winter months, December to March, no infections were encountered, but from April to November there was a fairly steady rise till in the last month 6·2 per cent. of 80 dogs examined were infected.

C M W

GUERRICCHIO (A.) Osservazioni clinico-statistiche sulla leishmaniosi viscerale e cutanea in Lucania. [Kala Azar and Oriental Sore in Lucania (Southern Italy).]—Riforma Med. 1935. Apr 27 Vol. 51 No. 17 pp. 628-630. With 10 figs. [16 refs.]

The paper gives an account of kala azar (12 cases) and oriental sore (24 cases) which the author has studied in the province of Matera in Southern Italy.

C M W

SAVACCHIO (Lucio) Sul kala-azar viscerale degli adulti. [Adult Kala Azar (in Sicily).]—Politecnico Sez. Prat. 1935. Aug 5 Vol. 42 No. 31 pp. 1527-1537

A description, accompanied by a lengthy discussion, of two cases of kala azar in adults (22 and 37 years of age) from the province of Palermo in Sicily. Both were cured by appropriate treatment.

C M W

NAJERA ANGULO (Luis) Las leishmaniosis visceral y cutánea y su importancia en España. [Leishmania Infection in Spain.]—*Medicina Paises Cálidos* Madrid 1935 Sept Vol 8. No 9 pp. 421-444 With 3 figs. (maps) [111 refs.]

In this paper the author has collected all the records that have been made of the existence of kala azar and oriental sore in Spain. Of the former disease there have been over 800 cases the distribution of which is shown on a map. The distribution of the recorded species of *Phlebotomus* is given on another map while on a third map the distribution of the disease and the sandflies is compared. As regards the disease itself it conforms in every way with the well known Mediterranean type of kala azar the greatest incidence being in very young children 2-3 years of age. The incidence of the disease in Spain is compared with the records from a number of other countries where figures are available. Oriental sore is less common than kala azar DE BUEN in 1934 having found records of 27 cases. The author considers that Kala azar should be made a notifiable disease in Spain.

C M W

DE BUEN (Sadi) Nota sobre un caso de kala-azar infantil en la provincia de Huesca.—*Medicina Paises Cálidos* Madrid 1935 Oct. Vol 8 No 10 p. 483

MARINA (Constantino) & MUÑOZ (Antonio S.) Un caso de botón de Oriente en la provincia de Murcia (Abaran).—*Medicina Paises Cálidos* Madrid 1935 Oct. Vol 8. No 10 pp 481-482 With 1 fig

COELHO (Joao) Premier cas au Portugal de kala azar chez l'adulte [First Case of Kala Azar in an Adult in Portugal.]—*Rev Méd et Hyg Trop* 1935 May-June. Vol. 27 No 3 pp. 124-128

Though infantile kala azar has been known for some time in Portugal the first case in an adult is the one referred to in this paper.

C M W

NATTAN LARRIER (L.) & GRIMARD (L.) Les chiens de luxe contaminés dans le midi de la France peuvent ils répandre la leishmaniose en dehors des foyers de la maladie? [Possibility of Spread of Leishmania Infection by Pet Dogs visiting the South of France.]—*Bull Soc Path Exot* 1935 Apr 10 Vol. 28. No 4 pp. 270-276

Though it is well known that in kala azar districts in the south of France the street dogs are liable to Leishmania infection it is not realized that pet dogs during a visit to these districts may contract infections which are carried to other parts of the country. The author calls attention to a number of such cases he has met with in Paris and he knows that similar ones have been encountered in Biarritz and Bordeaux. The possibility that such dogs may be the cause of human infections outside the known endemic areas of kala azar has to be recognized, for it is conceivable that the distribution of *Phlebotomus perniciosus* in France is more extensive than at present supposed.

C M W

Rossi (P.) Sur la présence de *Phlebotomus perniciosus* à Mâcon.
[*Phlebotomus perniciosus* in Mâcon].—Bull. Soc. Path. Exot. 1935. Apr. 10 Vol. 28. No. 4 pp. 282-284.

The author discusses the distribution of *Phlebotomus perniciosus* in France. Apart from the south of France where it is well known, it has also been recorded from Dijon and Bron. Its presence at Mâcon is now noted and the author thinks it possible that this sandfly will be found all over France. He draws attention to the danger of the sandfly spreading leishmania infection from infected dogs brought from the south of France.

C M W

POTCHECHUJEV (K.) [The Incidence of Canine Leishmaniasis in Ashkhabad].—Med. Parasit. & Parasitic Dis. Moscow 1935. Vol. 4 № 1-2. [In Russian pp. 112-116.]

The author examined the total canine population of Ashkhabad (Turkestan) numbering 3,385 out of which 87 (2.88 per cent.) proved to be infected with cutaneous leishmaniasis.

C A Hous.

DOVATIEN (A.) & LESTOGUARD (F.) Observations et réflexions sur la leishmaniose générale du chien. [Canine Leishmaniasis].—Arch. Inst. Pasteur d'Algérie. 1935 Sept. Vol. 13. No. 3. pp. 320-338.

The authors have kept under observation in Algiers 21 dogs which had naturally-acquired kala azar. The result has been to show that for periods of several months dogs known to be infected may show no symptoms whatever of the disease which is generally recognized by three signs—emaciation, keratitis and dermal lesions. Furthermore, leishmania were demonstrated in the skin of all the dogs even when the skin appeared to be perfectly normal. It is evident that smears made from the dermis can be used for diagnostic purposes, as has been proved by the finding of leishmania in 3 of 24 such smears sent to the laboratory by outside workers.

C M W

DOVATIEN (A.) & LESTOGUARD (F.) Notes sur la leishmaniose viscérale canine. [Kala Azar in Dogs].—Bull. Soc. Path. Exot. 1935 June 12. Vol. 28. No. 6. pp. 428-431.

With regard to the diagnosis of kala azar in dogs the authors call attention to the regular occurrence of leishmania in the skin of infected animals, even those which have healthy skins and show no clinical signs of their infection. As a rule the parasites are not numerous in the smears from the skin but they are there in proportion to the number of cells present, so much so that it would appear that the cutaneous infection is actually as intense as or even more so than that of internal organs. The authors emphasise the value of the formol-gel and antimony tests in this disease. In the former test they consider that two distinct reactions occur the one being a gelification and the other opalescence followed by opacity. It is the second, which may occur with or without gelification, which is of significance from the point of view of diagnosis of leishmania infection.

C M W

BENHABOU (Ed.) FAUGÈRE (R.) & CHOUSSAT (F.) Le diagnostic du kala-azar par les frottis dermiques. [Kala Azar diagnosed by Skin Scrapings.]—*Bull et Mém Soc Méd Hôpital de Paris* 1935 July 22 51st Year 3rd Ser No 25 pp 1326-1333

The two cases of kala azar in children 1 year and 8 years of age in Algeria are described because of the interesting discovery of leishmania in films made from the skin. The diagnosis in the younger child was made by spleen puncture. At the same time by using a vaccinostyle and avoiding haemorrhage 5 films were made from scrapings of the dermis on the thigh. In the spleen smears as also in all 5 dermal smears leishmania were found. The child was treated and received two courses of neotibosan during which clinical recovery was steadily maintained. During this time films were made regularly from the skin of different parts of the body. In all 14 sites were examined and in films from 12 of these leishmania were found. A dog apparently in good health which lived in the home of the child was examined by making smears from a piece of skin removed from the ear. In these leishmania were also found. In the case of the second child spleen puncture failed to give a diagnosis though smears from the skin succeeded. In this case again after treatment leading to rapid diminution in the volume of the liver and spleen and general improvement leishmania were still recovered from the skin on a number of occasions. The importance of the presence of parasites in the skin from the point of view of the spread of the disease by sandflies is commented upon.

C M IV

DOSTROVSKY (A.) The Diagnostic Value of Leishmania Vaccine.—
Ann Trop Med & Parasit 1935 July 17 Vol 29 No 2
pp 123-128. With 1 plate

A vaccine consisting of a suspension of 1 000 000 culture forms of *Leishmania tropica* in 1 cc. of phenol saline solution was prepared and employed in a skin test in which 0.1 cc. was injected intradermally a simple phenol saline injection being given as control. The injection produced an area of erythema, in the centre of which in positive cases an infiltration varying in diameter from 0.5 cm. to over 1.0 cm. occurs. Seventy cases of known infection were tested and a positive result was obtained in 98 per cent. The largest reactions were given by the tubero-ulcerative type of sore. Of 70 cases tested as controls there was a positive (+) reaction in 7. It is noted that in old sores leishmania may be difficult to find. In such cases the histological features of excised portions of the lesion may help in diagnosis. It is in these cases that the skin test may be of value.

C M IV

NATTAN LARRIER (L.) & GRIMARD (L.) Etude comparative de trois procédés destinés au diagnostic sérologique du kala-azar [Serological Diagnosis of Kala Azar]—*Bull Soc Path Exot* 1935 July 10 Vol 28 No 7 pp 658-665

The authors have noted that fixation of the complement occurs when serum of a kala azar case is mixed with serum of a rabbit hyperimmunized by the injection of culture forms of *Leishmania donovani*. This phenomenon may be utilized as a test for kala azar by adding progressive dilutions of serum from a hyperimmune animal to a fixed

quantity of the serum to be tested plus complement. After incubation for 1½ hours a haemolytic serum and corpuscles are added to discover whether any free complement is present. If haemolysis occurs the test is negative for leishmania infection. In the author's hands tested on both human and canine sera the complement fixation test is more certainly diagnostic than either the formal-gel test or the formal-neostibosan test, nevertheless it is their custom to apply all three tests to sera received for diagnostic purposes.

C M W

BONUOLO (Luigi) & GRECO (Zaira) Studi sullo leishmaniosi. II
Sopra la specificità ed il valore pratico di alcune reazioni immobili per la diagnosi della leishmaniosi viscerale. [The Diagnostic Value of Serum Tests in Kala Azar].—Ann. di Med. Afr. e Colon. 1935 May-June. 41st Year Vol. I No. 5-6 pp. 273-285.
[43 refs.]

The authors have tested on a number of cases of kala azar and other diseases various serological reactions which are commonly employed to aid in the diagnosis of kala azar. The Brahmachari test, in which distilled water poured on to the surface of serum gives a white ring, they consider of no value whatever. The Gatt and Papacostas (the formal-gel) reaction, though suggestive of kala azar when definitely positive cannot be regarded as specific. The same is true of Chopra's urestibamine test. In the author's opinion it has to be accepted that a diagnosis of kala azar cannot be established by any of these tests.

C M W

GIRAUD (Paul), BEAUMIRE, CLAUDIO & PRALAUD Réactions sérologiques de la leishmaniose chez un malade atteint d'endocardite maligne. [Malignant Endocarditis giving a Formal-Gel Reaction].—Bull. et Mém. Soc. Méd. Hôp. de Paris. 1935. May 27 51st Year 3rd Ser. No. 17 pp. 863-868.

A case with enlargement of the spleen was found to have a serum which gave a very strongly positive reaction with the formal-gel, the urestibamine and the peptone of iron tests. On this account it was thought to be a case of kala azar. The case was, however one of malignant endocarditis.

C. M. W

MARCHEKI (Franco) & SCAPARROCI (Ruccardo) On Certain Serological Tests used in the Diagnosis of Leishmaniasis in Dogs.—Jl. Trop. Med. & Hyg. 1935 Sept. 18. Vol. 38. No. 18. pp. 225-238.
[10 refs.]

The Brahmachari test for kala azar consists of the addition of one part of serum to two parts of distilled water. It is positive when a precipitate forms. In the formal-gel test of Napier a complete coagulation occurs in positive cases when a drop of formalin is added to 1 cc. of serum. The authors have applied these tests to 100 dogs, some of which had leishmania infections. The conclusion is that the tests are not sufficiently reliable to justify the abandonment of a search for parasites. When in man it is not possible to undertake an examination for parasites more than one type of serological test should be applied.

C M W

BALASHEVA (M T) [The Rieckenberg Reaction in Leishmaniasis 2nd Communication.]—*Med Parasi & Parasitic Dis* Moscow 1935 Vol. 4 No 1-2. [In Russian pp 19-22.]

In a previous investigation in which the Rieckenberg reaction or adhesion test was employed for the detection of the incidence of cutaneous and visceral leishmaniasis among the dogs of Old Bokhara it was found to be positive both in diseased and in apparently healthy animals. In order to eliminate the influence of endemicity from the results a similar investigation was carried out in Moscow where leishmaniasis is absent. Working with cultures of various leishmanial strains the author obtained results similar to those in Bokhara the reaction was negative in 16 dogs and positive in 19. In the course of the investigation it was observed that washed platelets did not take part in the adhesion that immunization of dogs with leishmanias did not increase the reaction and that the reaction was not specific since in cross-infections specific differentiation of the leishmanias could not be obtained.

C A Hoare

GIRAUD (P) & CIAUDO. Valeur de la réaction au sulfarsénol (Camino-petros) pour le diagnostic de la leishmaniose interne. [The Sulpharsenol Reaction in the Diagnosis of Kala Azar]—*Bull Soc Path Exot* 1935 May 8. Vol. 28 No 5 pp 379-381

CAMINOPETROS (J) Remarques sur la communication de M M Giraud et P Ciando Sur la valeur de la réaction au sulfarsénol pour le diagnostic de la leishmaniose interne. —*Ibid* July 10 No 7 pp 562-566.

CAMINOPETROS in 1934 described a new serological test for kala azar. This consisted in adding the serum to be tested drop by drop to 2 cc. of a 2.0 per cent. solution of sulfarsenol in distilled water. Sera from normal individuals or from cases other than those due to leishmania either produce no change in the solution or a slight turbidity which disappears when the 3rd to the 5th drops have been added. With kala azar sera the turbidity which appears is said to persist up to the 7th drop and sometimes up to the 20th. With a view to testing this procedure the authors have carried out the method on the sera of 100 cases of illness not due to leishmania infection. With these the original claim was substantiated for a turbidity which appeared with 88 sera disappeared at latest on the addition of the 5th drop. In the case of 7 sera from dogs suffering from kala azar the turbidity persisted to the 4th to 6th drops in 4 cases to the 7th in 2 cases and to the 10th in 1 case. For sera from 4 cases of human kala azar the turbidity disappeared at the 3rd, 4th and 5th drops. The authors conclude that the test is less reliable than other similar ones which have been proposed.

In the second paper the author replies to the criticism of his method by GIRAUD and CIAUDO. He points out that they did not carry out the test as advised by him in the first place. It is important to note that in the case of kala azar sera the turbidity which forms in the sulfarsenol solution transforms itself into floccules which sink to the bottom of the tube. Eventually a stage is reached when there is a collection of floccules covered by a perfectly clear fluid. The floccules themselves gradually dissolve leaving finally a clear yellow liquid. It is this deposition of floccules and their behaviour which is diagnostic of kala azar and not the mere production of turbidity.

C M W

VERDE (Michele). Il valore della ferro-reazione di Auricchio e Chieffi per la diagnosi della leishmaniosi infantile. [Auricchio and Chieffi's Ferro-reaction in Infantile Kala Azar].—*Pediatria* 1935. Aug 1 Vol 43 No. 8 pp 894-904 [32 refs.] English summary (7 lines).

The author has tested the iron reaction on the serum of a number of cases of kala azar and comes to the conclusion that of all serological tests for this disease it is the most reliable. The test consists in the appearance of opalescence when a mixture of 1 cc. of a 1 in 600 solution of peptonate of iron (Merck) and 0.2 cc. of serum is incubated at 37°C. for 10 to 40 minutes.

C M W

AURICCHIO (L.) & CHIEFFI (A.). Sul meccanismo della reazione al peptonato di ferro proposta per la diagnosi della leishmaniosi interna dell'infanzia. [The Peptonate of Iron Reaction in Kala Azar].—*Pediatria*. 1935. July 1 Vol 43 No 7 pp. 745-750. [14 refs.] English summary (6 lines)

The authors conclude that the opacity which is produced by the addition of peptonate of iron to the serum of kala azar cases and which they believe can be employed as a test for the disease is brought about by the high concentration of euglobulin in the serum of such cases.

C M W

FABIANI (G.) & DEDDALE (R.). Valeur de la lactopéptidase du srum sanguin comme test de guérison du kala-azar. [The Lactic Acid Test in Kala Azar].—*Bull. Soc. Path. Exot.* 1935. July 10. Vol 28 No 7 pp. 560-562.

Comparing the turbidity produced in the serum of kala azar cases by adding lactic acid with that given by the addition of formalin (formol-gel reaction) the author claims that the lactic acid produces its effect immediately it is added to the serum taken at the height of the disease whereas the formol-gel reaction may not be evident for some minutes. Furthermore during recovery, when the formol-gel test has ceased to give a positive result, the lactic acid test may be still positive proving that the lactic acid test is actually more sensitive than the other. Neither reaction however is absolutely specific for kala azar.

C M W

CARTANA (P.). Leishmaniose canine. Valeur de la réaction de gélification au formal et de la réaction au formol-stibosane pour le diagnostic. [The Formal-Gel and the Formal-Stibosan Tests compared in the Diagnosis of Leishmaniasis].—*C. R. Soc. Biol.* 1935 Vol 120 No 29 pp. 63-65

The formol-stibosan reaction carried out as described by MATTAN LARRIER and GRIMARD-RICHARD by adding to 0.5 cc. of serum 4 drops of a 10 per cent solution of neostibosan in 0.5 cc. of formal has given the author varying results in the case of 200 dogs examined for evidence of leishmania infection in Barcelona. Some sera flocculate almost instantaneously and after a few minutes develop into large clots which fill the tube others flocculate just as rapidly but do not form clots others again form smaller floccules which on sedimentation fill not more than half the tube while others produce much finer

floccules which give merely a deposit at the bottom of the tube. The first three results are regarded as definitely positive. As regards the formol-gel reaction the development of opacity within 6 hours of the addition of formol to the serum is read as positive. Of the 200 sera 44 were positive and of the animals from which these 44 were taken only 5 had visceral leishmaniasis. Of the 44 positive sera 12 were positive to both tests while 32 were positive only to the formol-stibosan test. Of the 200 dogs all of which were examined post-mortem only 5 were found infected and all these 5 gave sera positive to both tests on the other hand not all the dogs giving both tests positive were infected. It would appear therefore that the formol gel test is more reliable than the formol-stibosan test. C M II

D OELSNITZ. Similitudes et dissemblances cliniques du kala azar autochtone de l'enfant et de l'adulte [Clinical Resemblances and Differences between Infant and Adult Kala Azar].—Bull Acad Med 1935 May 21 99th Year 3rd Ser Vol 113 No 19 pp 687-689

The author calls attention to various differences which he has noted in the clinical manifestation of kala azar in infants and adults. Differences which he considers due to the fact that in adults the disease progresses slowly often with remissions whereas in children it develops more rapidly and steadily till death takes place. In both children and adults there is a serious danger of intercurrent infections. The chief differences noted are in the temperature curve the colour of the skin and the severity of the anaemia. C M II

VIRNICH (A.) Kala Azar bei einem Europäer in China. [Kala Azar in a European in China].—Arch f Schiffs u Trop Hyg 1935 Aug Vol 39 No 8. pp 345-347

The case recorded is that of a 24-year-old Russian who was found to have kala azar in Shanghai where he had been resident 9 months before the illness commenced. Previously he had resided in Pekin. It is not clear where the disease was contracted for Shanghai is not recognized as an endemic focus. The author thinks it is difficult to admit an incubation period of over 9 months. C M II

PETROV (V. B.) [A Case of Kala Azar in an Adult from Tadzhikistan].—Med Parazit & Parasitic Dis Moscow 1935 Vol 4 No 1-2. [In Russian pp 105-108]

The total number of cases of kala azar recorded in Tashkent since 1928 was 437 the majority (61.12 per cent) being infants from 1 to 3 years old. In the present report a description is given of a case in an adult who contracted the disease in Tadzhikistan. It is the first record from that region. C A Hoare

POPOV (P.) [On Papataci Fever, Sandflies and Leishmaniasis in Azerbaijan].—Med Parazit & Parasitic Dis Moscow 1935 Vol 4 No 1-2. [In Russian pp 107-111]

The author records for the first time the occurrence of papataci fever in Azerbaijan and reviews the incidence of oriental sore kala azar and

canine leishmaniasis in that country. A description is also given of the local species of *Paleobolus*. Numerous hamsters *Cricetulus sinicus formosus pulcher* were examined for the presence of leishmania with negative results.

C A Hoare

CHIERRI (Angelo). Un secondo caso di leishmaniosi infantile osservato a Sassari (associazione malaria leishmaniosi) [Malaria and Leishmania Infection associated in Sardinia].—*Pediatrics* 1935 Sept. 1 Vol. 43 No 9 pp 1073-1079. [13 refs] English summary (6 lines)

The case recorded is from Sardinia and is that of a child 3 years old in which both a malarial and leishmania infection were demonstrated.

C M W

SEI (Mo Tei). The Changes of Blood in Kala-Azar.—*Jl. Oriental Med* 1935 Apr Vol. 22 No 4 [In Japanese. English summary p. 64]

From a study of cases of kala azar in Mukden the author finds that the anaemia is the result of parasitic interference with the haematopoietic function of the bone marrow. The erythrocytes are thus biochemically similar to those of healthy blood though they are fewer in number. The diminution in number of the white and red cells is not always uniform, the ratio white to red being generally high but sometimes very low. The resistance of the red cells to hypotonic salt solution and saponin is not altered. There is a reduction in the viscosity of the blood, a delay in the coagulation time and an acceleration in the sedimentation of the red cells.

C M W

PITIE (Jean). Deux cas de kala-azar de l'adulte à évolution chronique. [Two Chronic Cases of Kala Azar].—*Bull. & Mem. Soc. Méd. Hôp. de Paris* 1935 July 8. 51st Year 3rd Ser. No 23. pp 1123-1129

A record of the history and successful treatment of two cases of kala azar in adults from Marseilles, the one 40 and the other 60 years of age.

C M W

SARNA (R. O. A.) & HALDER (K. C.). Some Observations on Dermal Leishmaniasis.—*Indian Med Gaz.* 1935 Oct. Vol. 70 No. 10. pp 544-550. With 8 figs.

The paper describes cases of dermal leishmaniasis of the post kala azar type which have been seen at the School of Tropical Medicine Calcutta, since NAPIER and Das GUPTA's accounts in 1930 and 1934. A fibroid type of the disease in which there is thickening and swelling of the fingers is noted for the first time. A lepromatous type is described and figured, in which an extensive nodular condition of the skin of the face and other parts renders a differential diagnosis from leprosy difficult. In an ulcerative type the nodules have a tendency to break down and ulcerate in which case examination for leishmania is carried out as in oriental sore. It is noted that, contrary to the general rule that the dermal condition appears some time after apparent recovery from kala azar one case was seen in which the visceral and cutaneous

infections were present at the same time. As regards treatment of the condition an advance appears to have been made in the discovery that a course of potassium iodide which may cause the nodules of some cases to ulcerate definitely helps the course of antimony. The good effect of iodides before the course of antimony is best seen in the lepromatous and fibroid types. Individual nodules have been successfully treated with local injections of berberine sulphate. It has been shown that the sandfly, *Phlebotomus argentipes* is as easily infected by feeding on the dermal lesions as by feeding on cases of kala azar. They are even fairly easily infected by feeding on the depigmented patches in fact a diagnosis can more readily be made in this way than by searching for parasites in smears or cultures made from the lesions. In one case out of 5 attempted, sandflies were infected by feeding on the chin of an individual who had had kala azar 2 years previously and who showed no signs of the dermal infection. The chin was chosen as the lesion of dermal leishmaniasis often appears there first. The paper is illustrated by a number of photographs depicting the various conditions described.

C M II

AMALFITANO (Gabriele) La leishmaniosi cutanea e gli merenti problemi non ancora risolti [Unsolved Problems of Oriental Sore].—*Riforma Med* 1935 Sept. 7 Vol. 51 No 36 pp 1351-1358. With 9 figs.

The paper after a general discussion on oriental sore describes 8 cases which were seen at a clinic in Rome in the course of a few months. All the cases were from the country east of Rome an endemic focus of the disease having been brought to light in Abruzzo in 1934.

C M II

BENNETT (S C J) Equine Cutaneous Leishmaniasis Treatment with Berberine Sulphate.—*Jl Comp Path & Therap* 1935 Sept. Vol. 48 Pt. 3 pp 241-243 With 2 figs on 1 plate.

A Sudan pony 8 years of age developed on its belly an ulcer with raised edges and central granulation tissue discharging an exudate which dried to form an easily removed crust. The lesion about 3.5 cm. in diameter resisted all ordinary treatment. Smears made from the granulation tissue gave an appearance indistinguishable from that obtained from a human oriental sore the parasites which were plentiful, being morphologically identical with *Leishmania tropica*. For treatment after discovery of leishmania 4 cc. of a 1.0 per cent. solution of berberine sulphate were injected through 7 or 8 punctures around the edge of the sore. The single treatment brought about a cessation of the discharge and the progressive growth of epithelium over the sore and though there developed a marked oedematous swelling of the region of the sore the healing continued steadily till at the end of 5 weeks both the swelling and the sore had disappeared. This appears to be the first case on record of what must be regarded as oriental sore in a horse. Leishmania infection of the spleen of a horse which died of an undiagnosed condition was described by RICHARDSON in Uganda in 1928 (*Trans Roy Soc Trop Med & Hyg* Vol. 19 p 411).

C M IV

Row (R.) On the Longevity of *Leishmania tropica* in Culture.—
Bull Soc Path Exot 1935 Apr 10 Vol 28 No 4 pp 269-270

In view of papers which have been published recently on the length of time leishmania will survive in culture, the author notes that in his medium, consisting merely of a simple haemoglobin saline solution, he has had survival up to 110 days. C M W

ZIA (Lily S) & TENG (C T) Survival, Growth and Flagellation of *Leishmania donovani* in the Presence of Contamination with Bacteria.—Chinese Med Jl 1935 Apr Vol 49 No 4 pp 304-312.

— & — Resistance *in vitro* of *Leishmania donovani* to Contamination with Bacteria.—Proc Soc Experim Biol & Med 1935 Apr Vol 32 No 7 pp 1010-1012.

By employing as medium a mixture of 0·4 cc. 10 per cent. solution of sodium citrate 0·5 cc. of human serum and 0·5 cc. of deposit of red cells in place of the usual \ \ \ medium the authors have shown that *Leishmania donovani* from hamsters will not only flagellate but will survive in the flagellate state for a month in association with various streptococci, staphylococci and pneumococci. The only organism which had a detrimental effect was *Bac. coli*. These experiments appear to the authors to afford an explanation of the presence of living leishmania in nasal secretion, as has been demonstrated in cases of kala azar. C V W

LIMOO (S) & BOUAROLO (L) Tentativi di filtrazioni del virus leishmanosico (*Leishmania tropica* e *Leishmania donovani* nelle fasi flagellata ed amigellata) (Nota sperimentale) [Filtrability of Leishmania Cultured].—Parasitologia 1935 June 15 Vol 27 No. 524 pp 353-356 [22 refs. English summary (9 lines)]

Attempts to demonstrate the presence of a filtrable phase of leishmania in cultures of these organisms have failed. C M W

VATTAN LARRIER (L) & NOURDJI (S.) Les variations du tropisme de *Leishmania donovani* chez les diverses espèces sensibles. [Tropism in Animals Infected with *L. donovani*]—C R. Soc Biol 1935 Vol 119 No 24 pp 957-959

In kala azar infections whether in man or animals the liver and spleen are always infected and in these organs the leishmania take up typically a position in the endothelial cells. This fundamental tropism for cells of mesodermic origin is common to all animals which can be infected. In addition, however there is an accessory tropism, the features of which are peculiar to each type of animal. It is the cause of the differences in the character of the infection in different animals. The special features of infections in man, dog, hamster and other animals are discussed. C M W

CHUNG (Huei Lan) Ueber Zellteilungen bei *Leishmania donovani* enthaltenden Klastmatozyten und ihre Bedeutung bei der Ausbreitung der Infektion im R.E.S [Clastmatoocyte Cells and Infection of the R.E.S in Kala Azar]—*Arch f Schiffs u Trop Hyg* 1935 Nov Vol 39 No 11 pp 474-482 With 17 figs

Two normal hamsters and two which were infected as the result of an injection given 2 months before were injected intraperitoneally with the fluid from a heavily infected emulsion of the spleen of a kala azar hamster. Two of the animals were killed 46 hours later and two after 68 hours. Cover glass preparations were made by smearing them on both the parietal and visceral peritoneal surfaces. These were dried and stained with Leishman stain. The most striking feature of these preparations was that in all of them there were present large cells of the clastmatoocyte type 90 per cent of which contained leishmania in numbers varying from 1 to 40 or more per cell. Another point was that many of these cells had nuclei in process of mitotic division which appeared to be proceeding quite normally in the parasitized cells. It would seem, therefore that not only does the reticulo-endothelial system hypertrophy as a result of the infection but also that a distribution of the leishmania throughout the body may be a result of the actual multiplication of the cells containing parasites.

C M II

REDAELLI (Piero) & PRIMA (Antonio) Problemi anatomici istopatologici e patogenetici della leishmanosi viscerale del bambino. Con illustrazione di tre casi. [The Histopathology of Kala Azar in Children.]—*Sperimentale* 1935 Feb Vol 89 No 1 pp 3-34 [20 refs] English summary

From a detailed study of the histopathology of three fatal cases of kala azar the authors conclude that the varying features of the disease are a result of the varying response of the reticulo-endothelial system to the parasitic invasion. The parasite which is a passive body is actively phagocytized by the host cell. The cell is incapable of destroying the parasite which finds the cell a medium suitable for its development. Attention is drawn to the fact that in certain fatal cases of kala azar there appears to be a decrease in the number or complete disappearance of the parasite during the last phases. The paper is of the nature of a lengthy philosophic discussion and gives little new information.

C M IV

GUHA (Pran Kumar) Studies in Kala-Azar With Special Reference to the Liver Function, before and after Treatment with Pentavalent Antimony Compounds (Urea Stibamine)—*Calcutta Med Jl* 1935 Oct. Vol 30 No 4 pp 193-218 [68 refs.]

An investigation of 23 cases of kala azar 8 of them after treatment with urea-stibamine has shown that in all the liver function as judged by the levulose tolerance test was normal. Urobilinuria was present in all cases. Of the 15 cases examined before treatment 11 showed the van den Bergh reaction to be negative while 4 showed a delayed positive van den Bergh reaction. Of the delayed positive cases one gave a high icterus index and bilirubin content of the blood in the range of latent

jaundice. The icterus index of 11 cases was taken before treatment. In seven of these it was normal while in 4 it was higher than normal and in the range of latent jaundice. There was a tendency for the index to fall during urea-stibamine treatment, which has the general effect of bringing about a return to normal of the other reactions also.

C M W

LEE (C. L.) & CHU (C. F.). Relative Value of Urea Stibamine and Neostibosan in the Treatment of Kala-Azar.—*Chinese Med. J.* 1935. Apr. Vol. 49 No. 4 pp. 328-339 [18 refs.]

The observations were made at the Peiping Union Medical College. It was found that an adequate course of urea-stibamine for a child was 1.0 to 1.5 gm. as contrasted with 1.5 to 2.5 for neostibosan. For an adult the figures were 1.5 to 2.5 and 4.0 to 5.0. Urea-stibamine is thus definitely more potent than neostibosan which, on the other hand, has the advantage of being a definite chemical compound of a lower toxicity. After treatment with either of these drugs patients must be followed for at least 7 months to a year before cure can be pronounced.

C M W

MARTIN (R.) CHORIÈRE (A.) & ROTCHÉ (G.). Un cas de kala-azar de l'adulte stibio-résistant, splénectomie guérison. [A Case of Kala Azar cured by Neostibosan after Splenectomy].—*Bull. Soc. Path. Exot.* 1935. May 8. Vol. 28. No. 5. pp. 382-389.

The case described is that of a Russian 21 years of age who contracted kala azar in the south of France. Treatment with neostibosan at first brought about improvement which, however, was not maintained, the case becoming completely antimony resistant. As ground was being lost splenectomy was performed. A good recovery from the operation occurred and after further treatment with neostibosan a cure was effected. A spleen puncture performed 4 days before the operation confirmed the diagnosis of kala azar but was followed by signs of internal haemorrhage which, however, ceased after several hours.

C M W

MAAB (J. P.). Ein hartnäckiger Fall von Kala-Azar (Leishmaniosis interna). [Kala Azar Resistant to Treatment].—*Monatsh. Med. Woch.* 1935. Nov. 1. Vol. 52. No. 44 pp. 1750-1753.

The case described is that of a man 40 years of age who became ill in Istanbul a year after going on holiday to Greece and Palestine. The case was very resistant to treatment, though a cure was eventually effected after courses of neostibosan, tartar emetic and ionadin.

C M W

RAT (J. C.). Studies on Protozoal Vaccine. Part I. Oriental Sore Vaccine.—*Indian J. Pediatr.* 1935. Apr. Vol. 2. No. 7 pp. 149-158. With 14 figs. on 4 plates.

In this paper the author gives an account of the treatment of oriental sore with a vaccine prepared from the culture forms of leishmania. The flagellates obtained from the first or second subculture on the surface of a blood agar medium are suspended in phenolized saline to give 20 million flagellates per cubic centimetre. The first dose of

vaccine given subcutaneously is 0.5 cc. for an adult. Other injections are given at intervals of 4-7 days the dose being increased according to the degree of reaction. The number of injections required varies from 3 to 5 according to the type of case. Of 187 cases treated a cure was effected in 151 while of the remainder 24 showed definite improvement. The duration of treatment varied from 15 to 28 days.

C M II

KASSIRSKI (I A) [Treatment of Cutaneous Leishmaniasis with *Ricinus Seeds.*]—*Med Parasit & Parasitic Dis.* Moscow 1935
Vol. 4 No 1-2. [In Russian pp 67-69 With 2 figs.]

The author describes the treatment of the ulcerating form of oriental sore in Tashkent with an ointment made from the whole seeds of *Ricinus* ground up and mixed with 10 per cent vaseline. The ointment based on a local remedy was applied every few days to the ulcer which was either covered with a collodion dressing or bandaged. The first application usually produced considerable irritation and a copious discharge of pus but as the treatment proceeds the irritation diminishes and healing may take place after 3 or 4 applications. The active principle is apparently ricin a toxalbumin which according to NOGUCHI agglutinates red corpuscles and leishmania. The author believes that ricin also stimulates the production of local immune bodies and is toxic to the flagellates and the pyogenic bacteria. The total number of cases successfully treated without leaving any traces was 16 some of which were in a very serious condition owing to various complications and had not responded to treatment by other methods. An attempt to apply the active principle to the treatment of canine visceral leishmaniasis failed for aqueous extracts containing 0.000004 gm. ricin introduced intramuscularly killed the dogs after the first or second injection.

C A Hoare

THE TYPHUS GROUP OF FEVERS.

MEGAW (John) Typhus Fevers in the Tropics.—*Treas. Roy. Soc. Trop. Med. & Hyg.* 1935 July 31 Vol. 29 No 2 pp. 105-110.
 FLETCHER (William) Typhus Fevers in Malaya.—*Ibid.* pp. 111-112.
 FELIX (A.) The Serology of the Typhus Group of Diseases.—*Ibid.* pp. 113-118. "10 refs."

A discussion on the subject at a meeting of the Royal Society of Tropical Medicine on the 20th June, 1935.

The discussion was opened by Sir John Megaw who spoke much on the same lines as he had done in opening a similar discussion at the Section of Tropical Diseases of the British Medical Association at Bournemouth in the previous year. Sir John referred to the recent work of ZIMMER who has suggested that Bull's disease in New York is neither flea-borne nor bee-borne typhus but that these cases are recrudescences of the disease originally contracted in Europe over 90 per cent of the cases occur in immigrants and the disease does not spread to contacts born in America—some of these people had been more than 20 years in the country before they developed the disease.

Sir John emphasized the fundamental importance from the epidemiological standpoint of the fact that louse-borne typhus is carried from man to man by the louse whereas the other typhus fevers are conveyed from an animal reservoir to man by fleas, ticks or mites and so are non-epidemic sporadic place diseases.

Dr Fletcher who followed, emphasized some recent advances in our knowledge of this group of fevers. In Malaya when tropical typhus was first discovered in 1924 it was a new disease in that country but since then the number of cases has increased and the severity of the disease is now much greater a mortality rate of nil in 1924 has increased to 12 per cent in 1934.

It has also been shown by LEWISWAITE that in Malaya there are numerous typhus viruses in the rats of that country strains of these viruses differ antigenetically not only from one another but also from the human typhus virus.

Dr Fletcher was of opinion that the most satisfactory method of classification of the typhus group of fevers would be primarily on a serological basis and secondarily by the vector—a serum test can be applied to every case whereas in many cases it is not possible to prove the vector. On the other hand a classification on a serological basis alone is not possible for example the diseases due to the virus corresponding to V19 must be divided into flea-borne and louse-borne (and even tick-borne São Paulo typhus).

Dr Felix referred to the close correlation between cross immunity and agglutination reactions with various types of Proteus V. He illustrated this by means of tables. Dr Felix did not agree that the typhus group of diseases could be classified according to the vector only—it has been shown that the viruses of louse-borne typhus and flea-borne typhus are antigenically identical yet their methods of transmission are entirely different also cases of so-called tick typhus in India belong to a variety of serologically different types of typhus. In conjunction with Colonel Heatley SPENCER, Dr Felix suggests a classification based on antigenetic types of virus on which immunity and immunoagglutination reactions depend. This classification was demonstrated in a table which has already been reproduced in this Bulletin [1933] Vol. 30 p. 406

D Harvey

WESTRA (S. A.) Nieuwere inzichten inzake de groep der vlekttyphusachtige ziekten [The Newer Views on the Group of Typhus-like Diseases.]—*Nederl Tijdschr v Geneesk* 1935 Oct 12. Vol 79 Supp. to No 41 pp 4835-4847 (411-423)

Dr Westra gives a detailed and critical account of the epidemic and endemic typhus group of diseases. His classification reduces them to 3 groupings—(a) Macular typhus in its epidemic and endemic forms comprising the epidemic typhus of Europe with the body louse as vector and the endemic murine typhus with its rat flea man cycle as exemplified by Brill's disease shop typhus and tabardillo. These are characterized by high serum-agglutination of *Proteus* λ 19 and absence of primary lesion. (b) The sub-group of Rocky Mountain fever and its allied affections such as *fièvre bordeonaise* with a tick as insect vector dog or rodent as reservoir and possibly some serum agglutination of both *Proteus* λ 19 and λ A. There is evident too in these forms a primary lesion. (c) The sub-group of tsutsugamushi all mite fevers and characterized by a rat or mouse-mite man cycle and strong *Proteus* λ A agglutination. Examples of these are the scrub typhus of Malaya the tsutsugamushi of Japan and the mite fever of Sumatra and Java.

A correlation appears to exist between the crossed immunity reactions of each disease form the type of insect vector and the respective agglutination titres obtained with the different *Proteus* λ strains. This correlation can scarcely be accidental. It is indeed suggestive of some new relationship between virus and *Proteus* whether of a symbiotic nature or perhaps even a genetic considering the lack of our systematic knowledge of the Rickettsiac.

The author too makes reference to the unitarian views of FELIX and RHODES who would ascribe all typhus-like diseases to one and the same virus which should then be regarded in its different manifestations simply as a serological variant.

Epidemic typhus it is emphasized has a very special position of its own as being transmitted by a human ectoparasite from man to man the occurrence of typhus in man for all the other forms is an accidental circumstance only brought about by insect transmission of the virus from a warm blooded animal reservoir and not at all from man to man. This latter point forms part of the dissertation of HOESEV who followed Westra and contends for the emendation of the Infectious Diseases Law of 1928 to give recognition to the difference in human infectivity of epidemic typhus and the typhus-like diseases. The law makes special provision for procedure in the case of cholera yellow fever plague smallpox and typhus. He would propose—(1) to substitute for typhus the term typhus diseases (2) to order segregation of the inmates of a dwelling from the patient only if the inspector has not declared in writing that segregation is not or is no longer necessary or that it may be replaced by supervision.

W F Harvey

HARVEY (D.) Typhus Fevers.—*Jl Roy Army Med Corps* 1935 July Vol 65 No 1 pp 1-8.

This review of the subject amplified and brought up to date is founded on a similar review written for and published in this *Bulletin* [Vol. 30 pp 343-49 406]

D H

NICOLLE (Charles) & LAIGET (J.) Vaccination contre le typhus exanthématique par le virus typhique vivant, déshabillé et enveloppé. [Anti-Typhus Vaccination by Living Virus].—C R Acad. Sci. 1935. Aug 5 Vol. 201 No 6 pp 372-374

The authors recall their suggestion made in 1911 that living virus might be employed as vaccine against true typhus but the method was abandoned as too risky. BLANC has used an attenuated rat typhus virus but in a good many cases fever has resulted after the inoculation. In the present paper the authors attempted to prepare a living vaccine made from a virus of rat typhus recently isolated in Tunis. This vaccine was prepared in the manner already described for yellow fever virus.

The virus employed was made from the brains of infected guinea-pigs and rats—the brains were ground up and dried and then enveloped in yolk of egg and suspended in water. The dose for vaccination was 1/200 of a brain. Out of 9 people treated with this vaccine 5 developed fever. It is noted that all 5 were inoculated from the brain of one rat. This method was abandoned and the virus was dried as before enveloped in yolk of egg and suspended in oil instead of water. 1st dose of 1/800 to 1/200 of a brain second dose 1/400 to 1/100 3rd dose 1/10 and as a test of protection.

One hundred and ten people were treated with this vaccine—none developed fever and all showed immunity to test dose of rat virus. Also animals treated with this vaccine were found to be immune to a test dose of the historic virus. The authors again insist on the necessity of general lousing as the chief measure of prevention against historic typhus.

D H

SABER (Mohamed) Essai du vaccin antityphique (méthode de Weigl) en Egypte. Trial of Anti-Typhus Vaccine (Weigl's Method).—Bull. Office Internat. d'Hyg. Publique 1935 Mar Vol. 27 No. 3 pp. 481-482

The vaccine (killed emulsion of Rickettsia from infected hov) was obtained from the Institute of Biology in Lwow. As only sufficient to inoculate 200 persons was procured it was decided to inoculate half of the inhabitants of the village of Exbek and to leave the remainder as controls.

In each household half of the family were inoculated and the other half acted as uninoculated controls. Of 183 persons inoculated only two showed some slight rise of temperature. Two cases of typhus occurred in the village after the inoculations, both in non-inoculated people none of the inoculated persons in the same households developed fever.

D H

GAUD (M.) Sur la vaccination humaine contre le typhus par la méthode de G. Blanc. [Vaccination against Typhus by the Method of G. Blanc].—Bull. Office Internat. d'Hyg. Publique 1935. Mar Vol. 27 No. 3 pp. 474-480. With 7 charts.

The murine typhus virus of Casablanca produces only mild fever in man. This virus obtained from the organs of infected guinea-pigs is diluted with saline and treated with ox bile and while still viable is inoculated into man and produces immunity usually without any appreciable reaction nor can the virus be isolated from the peripheral

blood of the inoculated persons. Passage of this virus through guinea pigs does not exalt the virulence either for men or for experimental animals. Seven hundred and twenty three men in the jail at Adir were inoculated with the vaccine which was prepared by Professor Blanc in the laboratory at Casablanca and sent to the jail where it was mixed with the bile just before the inoculations were made.

The infected guineapig was killed in the laboratory at 12 o'clock and the emulsion made and diluted 1/1 000 the vaccine was received at Adir at 2 o'clock and mixed with the bile and the inoculations were all completed by 3 o'clock in the afternoon.

Three hundred and nine men received 1 cc. of the 1/1 000 vaccine and 414 men 2 cc. Slight fever was noted in 5 of the men who received the 1 cc. dose and in 16 of those who received 2 cc. of vaccine.

Forty days later 5 uninoculated controls received 2 cc. of the virus and all reacted. Five men who had received 1 cc. of vaccine were also tested and 2 out of the 5 reacted. Five men who received 2 doses of vaccine were tested and none reacted.

D H

DIMITRIJEVIĆ SPETH (V) Die Abschwächung des Fleck typhus virus durch Gallebehandlung und Immunisierungsversuche mit gallegeschwächtem Hirnvirus. [The Weakening of Typhus Virus by Treatment with Bile, and Immunity Investigations with Bile-treated Brain-Virus.]—*Zent f Bakteriol I Abt. Orig* 1935 Apr 25 Vol. 134 No 1/2 pp 67-70 With 1 fig

The author has repeated the work of BLANC and his co-workers on vaccination with bile treated typhus virus.

Guineapigs were employed in the work and various dilutions of bile 1/10 and 1/20 and undiluted bile were used also the virus was exposed to treatment for periods ranging from 5 minutes to 160 minutes. It was found that when bile was mixed in equal parts with emulsion of brain and injected into guineapigs, after 15 minnites treatment the incubation period was prolonged and the duration of the fever was less than in controls whereas after 30 minnites exposure to the action of bile there was no fever at all in the inoculated animals but later these animals reacted to inoculation with virus immunity had not been established. Also repeated injections of bile-treated virus did not produce immunity in the guineapigs indeed in some of the animals death resulted from the fever produced by the test dose—anaphylaxis is suggested to explain this.

D H

ZIA (Samuel H.) Present Status on Vaccination against Typhus Fever—*Chinese Med Jl* 1935 July Vol. 49 No 7 pp 679-686 With 2 figs. [22 refs.]

The author refers to the early work of NICOLLE on the immunization of persons against typhus by means of minimal doses of living virus from either blood or brain of experimental animals.

Owing to the length of time required to carry out this procedure and especially on account of the risk of producing the fever in the inoculated this method was abandoned. The author then refers to the preparation of vaccines from emulsions of Rickettsia obtained either from lice (WICHL) or from rats and guineapigs (ZINSSER & MOOSER). These vaccines have been employed on a considerable scale and reports of

their use and the results have been summarized in this Bulletin from time to time. [See this Bulletin 1933 Vol. 30 pp. 400-887, 1934, Vol. 31 p. 248.]

D H

BESTAMAXTE (Alfaro) VARELA (Gerardo) & RIOS VERRI (Fernando).

Profilaxis del tifo por medio de suero [Prophylactic Serum in Endemic Typhus].—Bol Oficina Sanitaria Panamericana 1935 June, Vol. 14 No. 6, pp. 511-518. With 4 figs.

An outbreak of endemic typhus (Mexican type) occurred in 1934 in San José del Pacífico in the State of Oaxaca and in the first 7 months there were 168 cases 28 deaths and in the last three months the increase was marked, cases numbering 23, 40 and 70 and deaths 2, 5 and 12 respectively. A serum was prepared by daily peritoneal inoculations of white rats with rickettsia emulsion obtained from an infected animal. The peritoneal cavity was then washed out and the fluid, which contained abundant rickettsia, was injected into a horse for production of antiserum. Altogether 169 patients [in another place the numbers total 168] were injected, 20 of them on two occasions with 5 cc. of the serum. Three among those inoculated contracted the disease within 15 days, but 7 among 39 not inoculated. Among the 20 reinfected 3 were attacked within 30 days, none after that interval. Of the total 169 13 or 7.6 per cent were attacked within 60 days, but none died, whereas of 39 not injected 9 were attacked and 6 died. The authors conclude that the serum prepared with the Novoer strain of Mexican endemic typhus—a strain with murine characters—is active prophylactically and in modifying the severity of the attack in outbreaks, and adds further proof that the endemic and epidemic typhus in this part of the world is of murine origin.

H H S

CRUCA (JL) BALTRAUD (J) & COSTANTINESCO (N). La maladie inapparente comme réservoir humain de typhus exanthématisique. Son importance épidémiologique. [The Epidemiological Importance of Inapparent Typhus Fever].—Arch. Roumaines Path. Expér. et Microbiol. Paris, 1935, Mar. Vol. 8, No. 1, pp. 99-110. With 7 figs. [19 refs.]

An outbreak of typhus occurred among a group of 20 agricultural workers who were crowded together in one small hut. Of these 8 were sent to hospital with typhus.

The 14 contacts were cleansed, foused and rehoused—all of these remained healthy. The Weil-Felix reaction was tested and out of the 14 8 gave a positive reaction, 6 were negative. Blood from each of the 8 men who gave positive reactions was inoculated into guinea-pigs and all reacted; these viruses were passaged and studied. Emulsion of the brain of a guinea-pig infected with this virus was inoculated into a patient with G.P.I. but produced no reaction. Blood taken from this patient and inoculated into a guinea-pig produced a typical typhus reaction and was passaged to rats and guinea-pigs. From these guinea-pigs another patient was inoculated and he developed a very definite 14-days fever but without rash or other symptoms of typhus. Some 3 months later these two men were tested by the inoculation (accidentally) of virulent typhus blood—the man who had the inapparent infection developed fever and recovered, the other man who had had a definite fever did not react in any way—apparently the inapparent

infection had not developed immunity whereas the definite attack of fever although without other symptoms had produced a solid immunity.

The virus disappeared from the blood of the contacts in from 10 to 15 days. Although these 8 men did not develop definite attacks of typhus yet they were reservoirs of the virus and such contacts are a danger and may account for sudden outbreaks of the disease and for its endemicity. It is obvious that the occurrence of these inapparent infections is another argument for universal lousing of a population and not only of the actual cases of the disease.

D H

LORANDO (N.) Sur quelques cas de typhus endémique (maladie de Brill) à Athènes. [On Some Cases of Endemic Typhus in Athens.] —*Rev Méd et Hyg Trop* 1935 Jan-Feb Vol. 27 No 1 pp 23-30 [14 refs.]

Boutonneuse fever has already been met with in Athens but the two cases here described could be clearly differentiated as typhus by reason of the distribution of the rash and the marked nervous symptoms. Also the Weil Felix reaction was strongly positive for Proteus $\lambda 19$ and the virus was readily transmitted to guineapigs by injection of 2 cc. of blood from the patients and gave rise to typical symptoms of endemic typhus in the guineapigs.

Rats were numerous in and about the houses in which the cases occurred. Some of these were captured and killed and the typhus virus was isolated from them.

D H

STOTT (H.) The Immunological Problems of the Typhus Fever Group as raised by a Sporadic Case of Typhus (Vector Unknown) from Hamirpur in the Plains of India with a Note on the History of Tick Typhus in India.—*Indian Med Gaz* 1935 June Vol 70 No 6 pp 335-342. [11 refs.]

This paper commences if one might say so with an anticlimax—the author in the introductory paragraphs refers to two previous cases of tick typhus investigated at the Medical College Hospital in Lucknow and goes on to say that the present paper is concerned with the investigation of the third case of tick typhus in the same institution but on turning over a page one finds the following sentence. This third case is described here as tick typhus but in fact the vector was unrecognized. A more accurate scientific diagnosis would be a case of sporadic typhus due to an unknown vector. [The same remark would apply to the two previous cases.]

The author goes on to refer to the work of McKECHNIE who first recognized that a mild sporadic form of typhus existed in the Kumaon Hills in India and that this disease was not louse borne. McKECHNIE's observations were not published in the journals but appeared in official publications in India and were brought to light by MEGAW who himself contracted the disease in Kumaon and attributed it to a tick bite.

Similar mild forms of typhus had already been described in North Africa (CONNOR & BRUCE) and in South Africa (McNAUGHT) in 1910 and it had been suggested that these diseases might be due to tick bite although this was not scientifically proved until 1928 so far as these diseases are concerned.

The case under discussion in this paper was that of a missionary who had been camping in the Hamirpur district of Jhansi (where one of the two previous cases had also occurred) and he had undoubtedly been exposed to risk of tick bite. Clinically the case was typical of one of the typhus group of fevers, and showed a profuse roseolar maculo-papular rash with dusky subcuticular mottling on the body, limbs, face, feet, and hands. A few small petechiae were also noted. muscular and joint pains in the limbs and back were severe and insomnia was a marked feature. Mentally there was no toxæmic delirium nor even headache. The fever lasted 21 days and the rash faded slowly and brown staining of the skin remained for many days. The author states that the clinical diagnosis of "tick typhus" was clear [but which form of tick typhus is meant? Rocky Mountain fever, São Paulo typhus, boutonneuse fever and South African tick bite fever are all forms of "tick typhus" but all differ clinically from one another]. The differential diagnosis is very carefully gone into—dengue measles, cerebro-spinal fever, louse-borne typhus, mite typhus and typhoid fever are all considered and excluded.

The third section of the paper gives an account of very careful serological investigations which revealed the interesting fact that the serum of this patient gave (1) a positive Wassermann reaction which appeared early in the disease and again became negative 7 days after the fever had ceased; (2) a positive Widal reaction or at least a sympathetic rise of the inoculation agglutinins for *Bac. typhi-murium*; (3) a positive Well Felix reaction for Proteus X19 up to a dilution of 1/25,000; this is not usual for other forms of tick typhus although as the author points out it has been met with in other cases of sporadic typhus in India.

D H

RAGOT (Ch.) & DELBOUE (P.) Typhus endémique de Cochinchine.
[Endemic Typhus Fever in Cochin China.]—For Eastern Assoc
Trop Afr. Trans. Ninth Congress Nanking China 1934 Vol. 2
pp. 471-479

During the years 1933-1934 several cases of mild endemic typhus with a positive Well Felix reaction have been recorded in Saigon; other cases which were clinically the same but in which the Well Felix reaction was negative were also met with. A full clinical description of these cases is given; this does not differ from similar cases met with elsewhere as regards the rash, etc. but lung complications were common and may dominate the clinical picture.

Three types of case are described in detail—

1. Pneumonic case with positive Well-Felix reaction with *Proteus X19*.
 2. Endemic typhus type of case Well-Felix reaction positive with *Proteus XX*.
 3. Endemic typhus type of case Well-Felix reaction negative. In none of these cases was a primary sore (tache noire) noted. The authors state that in Cochin China the disease differs clinically from epidemic typhus, Japanese River fever and boutonneuse fever but resembles tabardillo tropical typhus of Malaya and especially the ship typhus of Toulon.

A virus was isolated from the blood of a patient and gave all the characteristics of a murine typhus virus; it has however not yet been possible to carry out cross-immunity tests. Lice were not found on any of the patients and there were no instances of cross-infection when cases were treated in general wards in hospitals.

D H

RAGIOT (Ch.) & DELBOVE (P) *Typhus endémique et typhus tropical en Cochinchine.* [Endemic Typhus and Tropical Typhus in Cochin China.]—Bull Soc Path Exot 1935 Mar 13 Vol. 28 No 3 pp 163-167

Cases of endemic typhus in which the Weil Felix reaction was positive to *Proteus X19* and negative to *Proteus A/H* have been recently reported from Cochin China. Three cases are reported in this paper in which the clinical symptoms were similar to the above (no primary sore) but the Weil Felix reaction was positive for *Proteus X/H* and negative for *Proteus X19*. A virus isolated from these cases gave the characteristics of a tsutsugamushi virus or scrub typhus of Malaya one of these cases occurred in a child in a town and not on the plantations.

D H

HERMANT *Au sujet du typhus exanthématique en Indochine* [Typhus in Indo-China.]—Bull Office Internat d'Hyg Publique 1935 Mar Vol. 27 No 3 pp 483-484

An historical survey of the subject. The papers referred to have already been summarized in the Bulletin

D H

PRIEST (R.) *A Fever of the Typhus-Group amongst the British Troops in Egypt.*—*1st Roy Army Med Corps* 1935 July Vol. 65 No 1 pp 9-14 With 1 chart.

An isolated case of typhus fever is described. Fever lasted for 15 days with a profuse roseolar rash on the body and limbs, soles of the feet and palms of the hands the Widal reaction was negative but it was noted that there was a sympathetic rise of the inoculation agglutinins in the blood blood culture was negative the serum taken on the 15th day of the disease gave a positive Weil Felix reaction in a dilution of 1/1,250 with *Proteus X19* negative to *Proteus A/H*

The patient remained in a drowsy condition throughout the fever no primary sore or tache noire was detected and no lice were found on the patient or on his clothing

There were no other cases in the barracks before or since The case is argued from the clinical and epidemiological aspects and it is decided that this was a case of rat-rat-sea man infection similar to cases reported in Toulon and other Mediterranean seaports.

D H

LASNET *Le typhus exanthématique en Algérie.* [Typhus in Algeria.]—Bull Office Internat d'Hyg Publique 1935 Aug Vol. 27 No 8 pp 1546-1553

Typhus fever occurs every year in Algeria and specially in the winter it is louse-borne typhus.

There are certain centres of the disease where it seems to smoulder along and every year epidemics start from these centres which are in the poorest parts of Algeria and epidemics occur if for any reason the economic condition of the people is lowered, for instance by drought and resulting famine. In good years there may be few or no cases in bad years there may be many Lice are always prevalent especially in the winter

Nowadays the disease is spread from these centres by people travelling especially is this the case at religious ceremonies and on journeys to sacred shrines.

Prevention—The first necessity is the discovery of the cases and notification of them. The second isolation of the patients. The third lousing of the patients and all contacts. If cases are few this may be done by the local medical authorities but in the event of an epidemic, equipment and personnel is sent out from headquarters the method of choice for lousing clothing and bedding is by sulphur fumigation owing to the extreme scarcity of water in many localities steam is not available in sufficient quantity. Lousing stations are now established in these endemic centres. No explanation is given for the carry over of the infection from one epidemic season to another but it is suggested that mild or inapparent cases occur during the summer

D H

MOREIRA (Jollo Affonso) & DE MAGALHÃES (Octavio). Typho exanthemático em Minas Gerais. [Exanthematic Typhus in Minas Gerais.]—*Brasil Medico* 1935 May 25 Vol 49 No 21 pp 465-470 With 3 charts.

This is a record of experimental work on the transmission by the larval or adult forms of *Amblyomma cajennense* and of *Cimex cephalotes felis* of the virus of typhus fever to a number of animals—dog, fox, teguixin [*Tupinambis teguixin* a lizard-like creature] armadillo opossum, chameleon camandongo [Brazilian house-rat] brown and grey rats and the hare. The second and possibly others of these can be infected, but the opossum is the only natural reservoir of the virus.

H R S

PIZA (José de Toledo). Importance de la tique dans la dissémination du typhus exanthématoire de São Paulo. [The Tick as a Transmitter of São Paulo Typhus.]—*C. R. Soc Biol* 1935 Vol 119 No. 22 pp. 751-753.

The author refers to the work of Moreirão and others who have shown that the virus of São Paulo typhus can be carried to experimental animals by the tick *Amblyomma cajennense*. He describes the case of a lady who had a tick removed from the shoulder a primary ulcer formed at the site of the tick bite and 4 days later this lady developed a severe attack of typhus fever with profuse rash and severe muscular pains.

A second similar case is described, the patient dying on the 13th day after the bite of the tick the incubation period in this case was only 24 hours.

The suggestion that lice may also carry the virus is discussed but the author does not consider that lice are carriers of the disease for several reasons, (a) the disease is not directly contagious and is sporadic and (b) it is a disease of rural surroundings.

D H

BERNALLES (Juan Voto) & RAMBARIN (Carlos A.). Segundo caso endóctono de fiebre exantématica observado en Lima. [Another Indigenous Case of Typhus in Lima.]—*Cronica Med* Lima 1934 Dec. Vol 51 No 838 pp. 482-489

This is the second case of "exanthematic fever" recorded as occurring in Lima. The patient was a man of 48 years and the disease

was severe death taking place on the fourth day after his coming to hospital. The Weil Felix reaction was negative but clinically the symptoms were typical. The murine type is known to occur in Lima and the author concludes [on unstated grounds] that the infection was conveyed by rat fleas.

H H S

LANGAN (A. M.) & MATHEW (R. J.) The Establishment of "Mossman," "Coastal" and Other Previously Unclassified Fevers of North Queensland as Endemic Typhus.—*Med Jl Australia* 1935 Aug 3 22nd Year Vol. 2 No 5 pp 145-148 With 2 figs.

In June 1935 a number of cases of so-called Mossman fever occurred in this district and in Cairns and Tully. It has already been suggested that these fevers really belong to the group of typhus-like fevers. Several of these cases were studied by the authors and they note the extraordinary diversity of clinical type. For instance the fever may be long or short lymphatic glands are enlarged in some cases not in others some show nervous involvement others do not. In 8 cases observed two showed profuse typical rash two showed no rash at all, four had slight and evanescent rash.

Weil-Felix reaction—Of 8 cases tested one gave a positive reaction with $\lambda 19$ and 7 gave a positive reaction with λK . All these showed a rise of titre during the fever and early convalescence. The author considers that the failure to obtain a positive result in previous cases was due partly to the use of unreliable cultures and to the testing of the serum early in the fever and not repeating the test later on.

D H

GUNTHER (Carl E. M.) Endemic Typhus in New Guinea.—*Med Jl Australia* 1935 June 29 22nd Year Vol. 1 No 26 pp 813-814

Two cases of endemic typhus are described.

These two men in the course of their work or rather on their way to work had to pass through freshly felled bush where they were exposed to the bite of the bush mokka (mite) as it is known by the people locally. A primary sore was noted in each case and the fever lasted about 2 weeks with fever headache and profuse rash. The serum of one of the patients agglutinated *Proteus* λK up to a dilution of 1/160 but not *Proteus* $\lambda 19$ the other case was not tested.

D H

PLAZY (L.) & GERMAIN (A.) Une modalité rare de la courbe thermique dans le typhus murin. [A Rare Type of Temperature Curve in Endemic Typhus].—*Bull Soc Path Exot* 1935 Mar 13 Vol. 28 No 3 pp 161-162. With 2 charts.

The fever in these cases was either remittent or intermittent the Weil Felix reaction was positive and a typical rash was noted. There were no rigors and no malarial parasites could be found [The charts given recall those of cases of trench fever]

D H

KODAMA (Makoto) Zusammenfassender Bericht ueber die Ergebnisse der experimentellen Fleckfieberforschung in Japan. [A Summary of the Reports of Results of Typhus Fever Research in Japan].—Zent. f. Bakteriol. I. Abt. Ref. 1935 July 4 Vol. 118 No. 5/6 pp. 97-103. [27 refs.]

The majority of the papers referred to have already been summarized in the *Bulletin*.

The Manchurian endemic typhus is compared with Mexican typhus and it is agreed that clinically and epidemiologically they are similar experimental work on animals also gives like results in the two countries.

D H

GOODMAN (Charles) & BRONK (Maurice) A Skin Test indicating a Previous Typhus Infection.—Proc. Soc. Experim. Biol. & Med. 1935 May Vol. 32 No. 8 pp. 1332-1334

Twelve men who had had typhus from 1 to 8 years previously were given an intracutaneous injection of 0.1 to 0.2 cc. of a formalized Rickettsia suspension prepared from the tunica of infected guinea-pigs all 12 showed an erythematous indurated area of 1 cm. to 4 cm. in diameter at the site of injection. Ten healthy adults who had not had typhus were similarly inoculated, none of these showed any reaction.

D H

GOODMAN (Charles) A Skin Test to suggest the Diagnosis of Recovered Typhus and Thrombo-Angitis.—Bull. New York Acad. Med. 1935 June 2nd Ser Vol. 11 No. 6 pp 403-412

The author traces a connexion between typhus fever and thrombo-angitis obliterans, indeed he considers that this condition is a late manifestation of typhus fever.

In order to get support for his suggestion he employed a sensitivity test using a formalized emulsion of Rickettsia which was injected intracutaneously.

Eleven people who had had typhus were tested, all gave a positive reaction and 17 people who had suffered from thrombo-angitis also gave a positive reaction whereas 18 controls were all negative.

A discussion followed and it was pointed out that there were hundreds of cases of thrombo-angitis in America which gave no history whatever of typhus but the author is inclined to the opinion that this disease is due to the typhus virus and may cause the condition without any other symptom.

D H

GROUD (Paul) & PIOTZ (Harry) Immunité croisée entre les cultures de typhus exanthémique historique ou murin et les virus de passage. [Cross Immunity between the Cultures of Historical and Murine Typhus and the Passage Virus].—C. R. Acad. Sci. 1935 April 1 Vol. 200 No. 14 pp. 1255-1258.

The cultures employed were those of a Mexican murine virus and a European classical or historical virus. The strains of virus in passage were one Mexican rat virus and one Tunis rat virus and an historical virus.

The guinea-pigs inoculated with the culture of true typhus virus and tested 3 months later were protected 11 times out of 16 against

the passage virus. The murine culture protected 13 times out of 15 against the passage virus.

The interesting point noted is that the infection produced by the cultures protected the guineapigs against the virus of passage better than the infection produced by the passage virus protected against the culture

D II

GIROUX (Paul) & PLOTZ (Harry) *Etude expérimentale des infections déterminées par les cultures des virus typhiques historique ou murin et des immunités qu'elles déterminent vis-à-vis de ces virus ou de leurs cultures.* [Experimental Study of the Infections produced by Cultures of Historic Typhus or Rat Typhus and the Immunity produced against these Viruses or the Cultures.]—*Arch Inst Pasteur de Tunis* 1935 June Vol. 24 Nos. 3 & 4 pp 420-434 With 8 charts.

Tissue cultures of Rickettsia were prepared and studied as regards (1) infectivity for animals (2) production of immunity.

The strains used in culture were (1) Mexican rat virus (2) European historic virus. Strains of passage viruses were (1) Human virus of Tunis (2) Mexican rat virus (3) Tunis rat virus.

The medium in which the cultures were made consisted of Tyrode's solution 2 parts guineapig serum (normal) 1 part and fragments of normal tunica tissue cells. The inoculum was either infected tissue cells or brain tissue. These cultures were incubated at 37°C for 10 days subcultures were made from tissue débris of previous culture mixed with fresh normal tunica tissue. The European virus was subcultured 10 to 17 times and the Mexican virus 70 times. These cultures stained with Laveran Borrel blue showed typical Rickettsia.

Inoculation of cultures of the human virus taken on the 10th day gave a typical fever in guineapigs without orchitis and when tested later these animals were immune to further inoculations of culture and virus.

Immunity reactions—(1) Guineapigs inoculated with above cultures were protected 11 times out of 16 against the various passage viruses (2) Guineapigs inoculated with the various passage viruses were protected 4 times out of 16 against the cultures of historic virus.

Inoculation of cultures of the Mexican rat virus produced fever in guineapigs and orchitis similar to that produced by inoculation of passage virus and gave immunity to further doses.

Immunity reactions—(1) Guineapigs inoculated with the cultures of Mexican virus were protected 13 times out of 15 against inoculation of the passage viruses (2) Guineapigs inoculated with the passage viruses were protected 3 times out of 14 against cultures of Mexican virus. These results are explained by the fact that the dose of Rickettsia or virus is much greater in the culture than in the blood of an infected animal or even in the brain

D H

GIROUX (Paul) *Action sur le virus historique de Tunis du sérum antityphique murin de Zinsser* [The Action of the Anti-Typhus Serum of Zinsser on the Historic Virus of Tunis.]—*Arch Inst Pasteur de Tunis* 1935 June Vol. 24 Nos. 3 & 4 pp 475-479 With 2 figs.

Guineapigs were employed in this research. These animals were inoculated with virulent blood from other guineapigs and 2 cc. of the

serum were given 2 hours, 24 hours, and 48 hours after the infecting dose. It was found that there was evidence of imperfect protection but if 3 doses were given the animals were protected against small doses of virus, i.e. guineapig brain.

D H

PRICA (Milan). Die Ratten als Träger des Fleckfiebervirus in Zagreb (Jugoslawien) [Rats as Carriers of Typhus Virus in Zagreb]—*Zent. f. Bakteriol. I Abt. Orig.* 1935 Apr 25. Vol. 134 No 1/2 pp. 63-67 [10 refs.]

Sixty-nine wild rats were captured in Zagreb and killed and the pooled blood was inoculated into guineapigs—a positive result was obtained on three occasions. From 30 white rats in the laboratory a positive result was obtained on one occasion. Twenty out of 75 wild rats gave a positive Weil-Felix reaction (26.6 per cent) whereas 18 out of 30 white rats gave a positive reaction (60 per cent.) The author suggests that the higher rate of infection among the white rats in the laboratory is due to the fact that they were crowded together in cages.

D H

NICOLLE (Charles) & SPARROW (Hélène). Le faible pouvoir pathogène pour les petits singes du virus murin I des rats du port de Tunis, inoculé par les voies péritonéale, sous-cutanée et conjonctivale. [The Feeble Pathogenicity for Small Monkeys of Rat Virus No. 1 of Tunis, inoculated by the Peritoneal Subconjunctival or Subcutaneous Route.]—*Arch. Inst. Pasteur de Tunis.* 1935. June. Vol. 24 Nos. 3 & 4 pp. 461-474.

It is well known that monkeys are as a rule very susceptible to typhus virus both rat and human—but it was found that this was not so with the No. 1 rat virus of Tunis. Six monkeys were inoculated intraperitoneally with this virus, only one had fever but all six gave a positive Weil-Felix reaction and were proved to be immune to typhus. The virus was even less potent when given by the conjunctival route and failed altogether to infect rats by this route [see following abstract]

D H

NICOLLE (Charles) & SPARROW (Hélène). Infection par voie conjonctivale des petits singes avec le virus typhlique murin I des rats de Tunis. [Infection of Monkeys by the Virus I of Rat Typhus via the Conjunctiva.]—*C. R. Acad. Sci.* 1935 May 20. Vol. 200. Nos. 21 pp. 1702-1704.

The virus of epidemic typhus is frequently pathogenic by the conjunctival route. Lice faeces or the crushed bodies of lice may contaminate the fingers of workers and if the eye is rubbed infection follows—several accidents in the laboratory have occurred in this way. The authors have shown that their No. 1 rat virus of Tunis is only feebly pathogenic for monkeys. The experiments recorded in this paper show that infection may be produced in monkeys if this virus is inoculated into the conjunctiva. Emulsion was made of the brain of rats and instilled into the eye, one drop at a time at half-hour intervals, 4, 5 and 8 drops. Of six monkeys tested none showed any fever but two gave a positive Weil Felix reaction and when tested later were found to be immune to the epidemic typhus virus.

D H

SPARROW (Hélène) Etude d'un nouveau virus typhique murin isolé d'un rat de la ville de Tunis [A New Strain of Rat Typhus Virus isolated in Tunis.]—*Arch Inst Pasteur de Tunis* 1935 Apr Vol. 24 No 2 pp 218-253. With 12 charts.

This strain of virus was isolated from a rat captured in a house in the town of Tunis some distance from the port where previous strains already described had been isolated. There had been no case of typhus in this house for many years. In 25 guineapigs in which this virus was passed fever resulted in all but two. As regards orchitis this was not seen till after the 6th passage and was regularly seen after the 21st passage. There was crossed immunity of this virus with other murine typhus viruses and with the epidemic or human virus.

Rats—Of 49 used all showed fever except one. Fifty per cent of the rats gave a positive Weil Felix reaction. D H

SPARROW (Hélène) Enquête sur la présence du virus typhique chez les souris de Tunis [Search for Typhus Virus in the Wild Mice of Tunis.]—*Arch Inst Pasteur de Tunis* 1935 June Vol 24 Nos. 3 & 4 pp 435-460. With 8 charts.

Three hundred mice were examined.

The brains were removed and kept in a frigidaire and tested for bacterial sterility. Lots of 2, 4 and 6 brains were emulsified and inoculated in doses of 1 to 2 cc. into rats and guineapigs. Two strains of virus were isolated from the mice.

These viruses were very carefully studied and were passaged in rats and guineapigs the protocols of the experiment are given in full. Crossed immunity experiments were carried out and showed the identity of the mouse virus with the virus No 1 originally isolated from rats in the Port of Tunis. There was also immunity against epidemic virus but not so complete. None of the sera of mice tested gave a positive Weil Felix reaction. Of 18 guineapigs inoculated with the mouse virus 13 developed orchitis. Rats inoculated with the virus had fever and a positive Weil Felix reaction was observed. Rabbits inoculated with the virus had an inapparent infection with a positive Weil Felix reaction. D H

GIROUD (P) & HABER (P) Non adaptation du virus typhique historique à la souris blanche après électropyrexie par ondes courtes. [Disappearance of Typhus Virus in White Mice after Treatment by Short Wave Electrotherapy]—*C R Soc Biol* 1935 Vol. 119 No 17 pp 135-136.

In previous work on the same lines the author has shown that the effect of electrotherapy on infected guineapigs is to prolong the period during which the virus remains viable in these animals. It is suggested that this is due to the action on the tissues causing a reduction, or preventing the production of antibodies. Similar work with white mice is recorded in the present paper and it was found that the electrical treatment had the effect of destroying the virus and it was not possible to passage the virus in treated white mice. D H

DONATIEN (A.) & LESTOGUARD (F). Existence en Algérie d'une Rickettsia du chien. [Rickettsia in Dogs in Algeria.]—*Bull. Soc. Path. Exot.* 1935. June 12. Vol. 28. No. 6. pp. 418-419

Dogs in the neighbourhood of the laboratory were found to be heavily infested with ticks (*Rhipicephalus sanguineus*) of 5 infested dogs 4 died. Examination of smears made from the walls of the large arteries revealed numerous typical Rickettsia in the monocytes these organisms were also found in cells of the peripheral blood taken just before death.

Monkeys were inoculated with material from the dogs and they developed fever and Rickettsia were found in the blood of these animals also. [The author seems inclined to regard this as a special strain of Rickettsia, for which he proposes the name *R. canis*.] D H

LÉPINE (P.) & LORANDO (N.). Le typhus exanthématoire du chat. [The Virus of Typhus in a Cat.]—*Bull. Soc. Path. Exot.* 1935. May 8. Vol. 28. No. 5 pp. 356-360

During an investigation of an outbreak of endemic typhus in Athens one case was noted in a house in a street where several cases had occurred on the bed of the patient a large black and white cat was sleeping. This cat was removed to the laboratory and killed and examined, an emulsion of the brain was inoculated into guinea-pigs and a typical murine typhus virus was isolated and passaged. This virus protected guinea-pigs against other typhus viruses both murine and human. Seventeen fleas [not named] were collected from the cat emulsified and injected into guinea-pigs and a similar virus was obtained from these.

As there were no other cases in contact with this man and there were no rats in the house it is considered that he became infected from the cat. Eight other cats were examined all from the endemic area and only one of these was found to be infected. Experimental work was carried out with cats and it was found that cats are not readily susceptible and the virus does not persist in them for any length of time. Cats can be infected by the intestinal route if fed on spleen of infected guinea-pigs. D H

TAMURA (Shogoro). Vergleichungen der biologischen und immunologischen Eigenschaften jedes Stammes von Weil-Felix'schem Proteus-X. [A Comparison of the Biological and Immunological Characters of Certain Strains of Proteus X.]—*Taiwan Igakka Zasshi (Jl. Med. Assoc. Formosa)* 1935. June. No. 6 (363) [In Japanese pp. 757-804 With 5 figs. on 1 plate. German summary pp. 805-806.]

Three strains of Proteus namely KK, X19 and X2 were obtained and the O and H varieties of each were compared and contrasted as regards the cultural properties heat resistance and serological reactions. The sera of persons suffering from diseases other than typhus were also tested and it was found that the sera of some syphilitic patients agglutinated Proteus cultures in fairly high dilution.

D H

PARKER (R. R.) Rocky Mountain Spotted Fever Results of Ten Years' Prophylactic Vaccination.—*Jl Infect Dis* 1935 July-Aug Vol. 57 No 1 pp 78-93 With 1 fig

The method of preparation of this vaccine has already been fully described in previous papers. It is made by emulsifying the tissues of virus laden adult wood ticks in formal phenol saline. Five hundred ticks are emulsified at a time and make some 400 cc. of vaccine. Each batch of vaccine has to be standardized by protection tests with guineapigs and the dose estimated usually 1 cc. for children and 2 cc. for adults.

This vaccine was first used in 1925 as a prophylactic and in this paper the results of 10 years trial are recorded.

At first only 10 litres of vaccine could be manufactured in a year but over 200 litres were prepared last year. In early days two test areas were selected, one in Montana where the cases were few but the case mortality high the other in Idaho where cases were more numerous and the mortality much lower. The results of the first four years trial in these two districts were collected and studied and it was decided —

- 1 That the vaccine had definite value for prevention
- 2 In Montana with the virulent type of the disease the vaccinated had milder attacks and recovered, the unvaccinated died.
- 3 In Idaho against the mild type of the disease there was full protection in the vaccinated.

In the 10 years up to 1934 150 000 people have been vaccinated and of these 64 have developed the fever 45 of these in the same season in which they were vaccinated.

In the Bitterroot valley Montana the mortality in unvaccinated adults was 82 per cent whereas the mortality among vaccinated adults was only 6 6 per cent.

There have been 22 cases of infection among the workers in the laboratory dealing with the Bitterroot virus. Seven of these were not vaccinated and all died 15 were vaccinated and only one of these died.

As regards Idaho where the mortality is low in 193 vaccinated shepherds frequently exposed to infection only one case occurred whereas there were 22 cases among 364 controls similarly employed.

It may be said generally that the vaccine confers immunity against the mild virus and reduces the severity of the disease with the highly virulent strains. There is some evidence that the immunity extends into the second season after vaccination

D H

MAILLARD (E. R.) & HAZEN (E. L.) Rocky Mountain Spotted Fever in New York State outside of New York City—*Amer Jl Public Health* 1935 Sept. Vol. 25 No 9 pp 1015-1017 [Abstract by the authors.]

A brief summary is presented of ten cases showing clinical evidence of Rocky Mountain spotted fever which have occurred in New York State (outside of New York City) from 1926 to 1934 as well as the results of the agglutination tests performed with *Proteus X19* with blood specimens from the patients.

In nine cases there was either clinical evidence of tick bite or a definite history of contact with ticks before the onset of illness. None of the cases could be associated with flea bites. The distribution and

character of the rash in the majority of the cases were strikingly similar appearing early on the extremities, later becoming generalized.

An agglutination reaction was demonstrated with *Proteus O19* and the blood sera from eight of the ten patients and partial agglutination was obtained with two of the sera.

NICOLLE (Charles) & SPARROW (Hélène). Quelques expériences pratiquées avec le virus de la fièvre fluviale du Japon (Tatsu-gamushi) [Experiments with the Virus of Japanese River Fever] —*Arch Inst Pasteur de Tunis*. 1935. Apr Vol. 24 No 2 pp. 179-217 With 16 charts.

Two strains of the virus of Japanese River fever were sent to Tunis by Professor NAGAIO only one of these strains however survived the journey, and it is this strain Chiba, which was employed by Professor Nicolle in the work described in this paper.

The virus arrived in a rat after 4 passages on board ship on the way from Japan and the blood of this rat proved infective for a monkey when inoculated into and under the skin. Forty-six monkeys in all were inoculated mostly as "indicators" of infection as these animals all reacted with fever whereas rats rabbits and guineapigs had inapparent infections as a rule.

Of 12 monkeys which were inoculated with equal doses of virus full details are given. 11 reacted with fever the incubation period was from 4 to 11 days and the duration of the fever varied from 2 to 11 days. No local lesion was noted in any of the monkeys although the virus was inoculated into and under the skin. The Weil-Felix reaction, which was tested in all cases, usually became positive after the fever had ceased and although *Proteus O19* was agglutinated *Proteus O1K* was agglutinated in higher dilution. The former was agglutinated to a dilution of 1/160 in 3 cases whereas the latter was agglutinated to 1/160 four times, to 1/320 three times 1/640 once and to 1/1,200 twice.

It is interesting that the blood of monkeys reacts somewhat in the same manner as that of human beings whereas as will be shown later the blood of infected rats did not agglutinate *Proteus O19* but agglutinated *Proteus O1K*.

Rats.—The authors found that with the strain Chiba rats showed only an inapparent infection the only signs of infection being that if the rats were killed from the 9th to 14th day after inoculation the organs were infective for monkeys and these animals developed fever. Also the Weil-Felix reaction of the serum of the rats became positive for *Proteus O1K* but not for *Proteus O19*. Of 38 rats examined 16 gave a positive reaction for *Proteus O1K*. The blood of rats when inoculated into the anterior chamber of the eye of rabbits did not produce the typical reaction described by Japanese workers. Nicolle considers that this was due to loss of virulence of the virus in rats. On the other hand blood of infected monkeys produced this typical reaction in the eye of rabbits. The blood of infected rats injected intrarectally in lice was followed by multiplication of Rickettsia in these insects.

Guineapigs.—Infection was usually inapparent but several animals had attacks of fever after incubation periods of 2 to 3 weeks. As regards the Weil-Felix reaction in these animals it is pointed out that the sera of guineapigs whether infected or not, do not agglutinate

Proteus OX19 whereas that of normal guineapigs agglutinates *Proteus OXK*

Crossed immunity experiments were carried out and it was found that river fever virus protected against itself but not against typhus nor did typhus virus protect against river virus. Extensive experiments were carried out with fleas and lice which were fed on infected animals. It was found that river virus remains active in lice for 7 days after the infected feed but cannot be conveyed by their bite. The virus remains active in fleas for 11 days and can be conveyed by their bite.

D H

WOLFF (J W) & KOUWEVAAR (W) *Onderzoeken over de Sumatraansche mijtkoorts. IX Ooginfecties bij konijnen [Sumatra Mite Fever Eye Infection in Rabbits.]—Geneesk Tijdschr v Nederl Indië 1935 May 14 Vol. 75 No 10 pp 805-810 With 5 figs on 1 plate. English summary (10 lines)*

The work of NAGAYO and others on the eye lesions obtained by injection of the virus of tsutsugamushi disease is recalled and a description is given of the macroscopic and microscopic appearances produced. Soon after the publication of the Japanese work the authors proceeded to test the mite fever virus of Sumatra in the same way but have obtained much less constantly positive results than the Japanese investigators. Albino rabbits are to be preferred as the iris then has no pigment and 0.2 cc. aqueous humor is withdrawn before the injection of 0.1-0.2 cc. infective suspension. The most constant results are obtained by using testicular passage suspension of rabbits and by subpassage with virulent aqueous humor. A positive reaction with patient's blood was only once obtained. Opacity of the cornea made its appearance between the 7th and 18th day. Rickettsia were present in all corneal preparations in large number especially from the posterior surface and were exclusively intracellular. The inflammatory cell reaction a kerato indo-cyclitis was situated chiefly at the periphery of the cornea at the junction of iris and cornea round the canal of Schlemm and in the basal portion of the iris. It consisted of round cells and eosinophils. An exudate which formed on the posterior surface of the cornea showed the same cell elements. No general symptoms appeared except in three rabbits which developed fever for a few days.

W F Harvey

VAN WAARDENBURG (D A.) *Over een geval van tropical typhus en een geval van mijtkoorts in de Residentie Benkoelen.—Geneesk Tijdschr v Nederl Indië 1935 May 28. Vol. 75 No 11 pp 878-892*

GIUNTA (Giuseppe) *Sopra alcune febbri endemiche della costa dell'Oltregiuba. [Some Fevers Endemic on the Coast of Oltre-giuba.]—Ann ds Med Nav e Colon 1935 July-Aug 41st Year Vol. 2. No 1-2. pp 493-511 [23 reis.]*

[No atlas at our disposal mentions Oltregiuba but from the casual mention in the text of Benadir we infer it to be a district of Italian Somaliland.] Febrile attacks are designated by local names according to the districts where they occur such as Chisimao Benadir fever in addition to the better known dengue and papataci fever and (1578)

influenza, which goes by the generic name of *Kanso*. From the author's account they may be classed under one or other of these last three. A descriptive case of each is given.

H H S

CHRISTIAN (C. R.) The Well-Felix Reaction in Fevers of Uncertain Origin.—*Jl Roy Army Med Corps* 1835. Oct. Vol. 65. No. 4 pp 247-251

Two mild cases of fever are described, in neither of these was any rash observed at any period, the fever in both cases lasted nine days and the highest point reached was 104.8°F.

Malaria was excluded by careful examination of blood films—blood, urine, and stool cultures attempted on several occasions during the fever were negative. The white blood cell count was normal, there were no enlarged glands and no other signs or symptoms.

The blood sera gave the following reactions expressed in standard agglutination units in the case of the Widal reaction—

Case No. I.

	Day of Disease				
	4	7	11	15	19
<i>Well Felix</i> —					
O					
X19	17	0	0	44	25
X2	52	19	192	367	282
Xh	64	64	220	367	367
<i>Widal</i> —					
T	23	21	42	31	31
A	23	16	49	48	33
B	58	71	143	185	133
T "O"	0	0	19	0	0

Case No. II.

	Day of Disease				
	6	10	11	13	17
<i>Well Felix</i> —					
O					
X19	22	44	44	32	
X2	19	170	170	170	
Xh	33	232	232	182	
<i>Widal</i> —					
T	48	375	187	110	
A	83	37	37	37	
B	143	66	72	65	
T O	0	0	0	0	

Four other cases which were clinically typical of typhus with profuse rash, headache, delirium and insomnia, and polymorphonuclear leucocytosis were also tested and gave practically identical reactions as regards the Well-Felix test. This paper brings to light two interesting facts—the first is that mild cases of fever without rash or other classical symptom of typhus fever may give a positive Well-

Felix reaction even in greater dilution than cases which are clinically true typhus second that there are in India several serological varieties of typhus fever in the present series 4 cases gave what might be described as a positive group reaction for X19 X2 and XK whereas one case in which XK was agglutinated (up to a serum dilution of 1/10 000) gave negative reactions with X2 and X19

The results of the Weil Felix reaction and Widal reaction for one of these severe cases is given below for comparison.

	Day of Disease					
	4	8	12	16	20	25
Weil-Felix—						
O						
X19	17	17	145	170	192	85
X2	64	64	282	282	282	170
XK	73	183	192	322	322	250
Widal—						
T	71	71	71	63	80	75
A	19	39	48	64	64	64
B	36	72	333	717	427	286
T O	69	84	96	110	74	73

Concentrated O emulsions were used in all cases so that these results can be relied upon this is not always the case when one reads that cultures of *Proteus* λ are subcultured many times in laboratories without any check on the appearance of H forms in the cultures.

D H

SCHULZ (H H) Clinical Experiences with Some Diseases giving a Positive Typhus Reaction.—*South African Med Jl* 1935 Apr 13 Vol 9 No 7 pp 225-230 With 6 figs.

The author has noted that in his experience cases of fever which give a positive Weil-Felix reaction may be of very varied clinical appearances.

He divides these cases into three main types 1 The pneumonic type. 2 Typhus type. Without definite lung symptoms but with delirium and meningeal symptoms the rash in these cases may be atypical and in some cases does not appear at all. 3 Muscular type. Without fever or rash characterized by insomnia and headache and pain at the back of the neck. The muscles of the legs arms and back are painful and weak and the gait spastic.

D H

DENGUE AND SANDFLY FEVER.

MCCORMICK (J M) & VALLOTTION (J Ralph) Dengue Fever Report of One Hundred Cases studied at Jackson Memorial Hospital during the Miami Epidemic, 1934—*Southern Med Jl* 1935 July Vol. 28 No 7 pp 635-638 With 4 charts [14 refs.]

In addition to the clinical study some experimental work was carried out. It was found that filtered serum from an active case

was infective for a volunteer. Blood used for transfusion, taken inadvertently during the incubation period of the disease gave rise to a severe attack in the recipient. All experimental animals tested were found to be resistant. Attempts made to reinfect volunteers after an attack failed.

Rash was noted in 50 per cent. of the cases only and was maculopapular and situated on the chest abdomen, neck and arms enlarged cervical and epitrochlear glands were noted, there was a marked decrease in the number of the polymorphonuclear cells of the blood and an increase in the lymphocytes. One case admitted as dengue with fever and abdominal pain was later diagnosed as appendicitis and operated on. A perforated appendix was found. As the author puts it "a stormy postoperative course followed, culminating in a lethal exodus." This case is interesting in view of the paper by SAXXER & LORMAIGNE which follows.

D. Harry

SAXXER (L.) & LORMAIGNE A propos d'une forme clinique rare de la dengue et affections voisines (Dengue like Fevers des auteurs anglais) Concerning a Rare Clinical Type of Dengue and Allied Infections. Dengue-like Fevers.—Arch. Med. of Pharo 1935 Apr-May-June Vol 125 No 2 pp. 297-301

As a rule in dengue pains are complained of all over the body and limbs but not in the abdomen. But in the 3 cases described in this paper abdominal pain was a marked symptom. There was rigidity of the muscles of the abdomen and tenderness. Appendicitis was suspected and one of the cases was operated on, but the appendix was found to be healthy although the surrounding tissues and the appendix itself were oedematous.

D. H.

SHARP (William B.) & HOLLAR (Emory). Immunity in Dengue Fever.—Amer Jl Trop Med 1935 May Vol 15 No 3 pp 247-264 62 refs.

A review of the literature on the subject with observations on local epidemics of the disease in Galveston, Texas.

Judging from the widespread nature of epidemics of the disease when they occur in populations not previously exposed to infection there would appear to be no natural resistance in any race. Resistance is acquired and is due to one or more previous attacks of the disease. In Galveston, Texas, for instance two-thirds of the population were attacked during the epidemic in 1922.

Freedom from attack during an epidemic is either due to immunity derived from a previous attack or to protection from mosquitoes by screening. Relapses and reinfections do occur but as a general rule there is protection for some considerable time at least one year. It has been suggested that these reinfections may be due to different strains of virus others suggest that reported second attacks of dengue may arise from mistakes in diagnosis. As compared with yellow fever a disease with which dengue has often been confused, the immunity following an attack of dengue is neither universal nor permanent as it is following yellow fever.

Attacks of dengue fever do not protect against yellow nor vice versa, neither do the sera of dengue patients neutralize the yellow fever virus.

The sera of several people who were known to have had dengue previously were taken and were tested by the mouse protection test but there was no evidence whatever of any protection some of these people had had very severe attacks of dengue and a diagnosis of yellow fever had been suggested. [See this *Bulletin* 1931 Vol 28 p 718 1932 Vol. 29 p 14 1933 Vol. 30 p 408.] D H

MURRAY (A. J.) A Case of Paratyphoid A simulating Dengue—West African Med Jl 1934 Oct Vol 8 No 2. p 15

SHORTT (H E) POOLE (L T) & STEPHENS (E D) Note on Some Experiments with Sandfly Fever Blood and Serum.—Indian Jl Med Res 1935 July Vol. 23 No 1 pp 279-284 With 2 charts.

The authors refer to previous work by them on the same subject. The object of the present study was to see if men who had had sandfly fever the previous season could be reinfected in the following year.

Blood from 3 cases of sandfly fever was sent from Peshawar to Kasauli. These bloods were divided into two parts and one part was injected into a volunteer who had not previously been inoculated the other part into an old volunteer who had had fever in the previous year. The results were 2 typical attacks in 2 new volunteers 2 modified attacks in 2 old volunteers. One blood failed to infect either old or new. Serum sent from a case of sandfly fever was found to be infective but, if convalescent serum was first inoculated and then the virulent serum no fever resulted when tested later this volunteer did not develop fever. D H

SHORTT (H E) POOLE (L T) & STEPHENS (E D) Sandfly Fever on the Indian Frontier A Preliminary Note on Some Laboratory Investigations.—Jl Roy Army Med Corps 1934 Dec Vol 63 No 6 pp 361-367 & 1935 Jan Vol 64 No 1 pp 17-24 With 5 charts. [10 refs.]

CARRION'S DISEASE

ESCOMEL (E.) Localisation géographique de la maladie de Carrion ou *Verruga* du Pérou [Geographical Distribution of Carrion's Disease].—Bull Soc Path Exot 1935 June 12 Vol. 28. No 6 pp 405-407

This disease is found only in Peru and in that country it is confined to certain valleys and ravines where special vegetation and sandflies exist.

Carrion's disease commences at 2 000 feet and ceases at 8 000 feet. The particular plants are lactaceous cactus plants such as euphorbia and the sandflies are *Phlebotomus Noguchi* and *Phlebotomus verru canus*. It is suggested that these plants are the sources of food and of virus to the fly. Certain investigators have found Bartonella in the latex of these plants. It is suggested that clearing of these plants from the valleys and ravines would be a method of prevention of the disease.

D Harvey

RELAPSING FEVER AND OTHER SPIROCHAETOSSES.

COWTEAGHAM (J) & FRASER (A. G. L.) Further Observations on Indian Relapsing Fever Part II. The Serology of Relapsing Fever in Human Beings.—*Indian Jl Med. Res.* 1935. Apr Vol 22 No. 4 pp. 595-616. With 9 charts. [33 refs.]

This article is a continuation of the authors' observations on the serology of Indian relapsing fever [see this Bulletin 1934 Vol. 31 p. 847] and shows that the results previously obtained in experimental animals agree with those derived from the study of human infections.

The various types of *Spirocheta carri* isolated from louse-borne epidemics of relapsing fever in North and South India were found to be identical.

The following human sera were tested against types A, B and C.—

- (a) Samples taken from 132 cases obtained from an epidemic of the disease in the Nilgiri Hills in the Madras Presidency in 1924
- (b) Eighteen samples from three sporadic outbreaks occurring in the Punjab—Multan Hazro and Dera Ghazi Khan.
- (c) Twenty-nine samples from three areas in the North-West Frontier—The Kurram Valley Droush (near Chitral) and Quetta.

Most of the sera were found to belong to types A and B and the antibody formation in these human cases followed the same course as that already described in experimental animals. Most of the sera derived from patients on the North-West Frontier failed to react with any of the louse-borne types of spirochaetes. It is possible that there may be some serological affinity between the spirochaetes causing the louse-borne type of relapsing fever and the tick-borne variety occurring in the North-West Frontier but its extent is doubtful. Where reactions did occur however the C type was the one most frequently involved.

Sera obtained from both types of relapsing fever in India, failed to agglutinate three strains of spirochaetes, including two European strains of *S. recurrens*, and one of *S. duttoni*. E. Hindle

GILLESPIE (James O.) Relapsing Fever in the United States.—*Jl Amer Med. Assoc.* 1935. May 23. Vol. 104 No. 21 pp. 1878-1881 With 1 chart. [14 refs.]

A general account of the subject with the object of calling the attention of physicians to the features of a disease which is probably endemic throughout the entire Southern half of the United States, wherever ticks of the genus *Ixodes* find their habitat. E. H.

ANDERSON (Charles) Sur la présence d'*O. erraticus* infecté par *S. kusnezovi* dans la banlieue de Tunis. [The Presence of *O. erraticus* Infected with *S. kusnezovi* in the Neighbourhood of Tunis.]—*Arch. Inst. Pasteur de Tunis.* 1935. June. Vol. 24 Nos. 3 & 4 pp. 483-492. With 3 charts.

The author has infected guinea-pigs with a strain of *S. kusnezovi* by inoculating them with a suspension of the contents of *O. erraticus* collected from burrows of *Mus domesticus* in the neighbourhood of Tunis.

The ticks refused to feed on experimental animals and therefore it was impossible to test whether their bite is infective. The spirochaete was shown to belong to the *kusnezovi* group by means of cross

immunity tests and as it was shown to be pathogenic to monkeys *M. cynomolgus* it is probably infective to man. Attempts to transmit the infection by means of *A. cheopis* *Haematoxipus suis* *Gyropus gracilis* and *Rhipicephalus sanguineus* all gave negative results.

This discovery of infected *O. erraticus* in North Tunis fills one of the gaps in the distribution of Spanish African relapsing fever in North Africa.

E H

COLAS-BELCOEUR (J) Evolution post-embryonnaire et mues de *1 Ornithodoros erraticus* [The Post-Embryonic Development and Moults of *O. erraticus*].—Bull Soc Path Exot 1935 July 10 Vol. 28 No 7 pp 604-606

At temperatures of 23° and 32°C with a relative humidity of 90 per cent. the number of nymphal stages was found to vary from 3 to 5. Third stage nymphs when moulting may give rise to adults both male and female, or to 4th stage nymphs the latter when moulting generally give rise to females but exceptionally to males or even to 5th stage nymphs. These invariably gave rise to females at the moult 6th stage nymphs were never observed.

E H

WHEELER (C. M.) HERMS (W. B.) & MEYER (H. F.) A New Tick Vector of Relapsing Fever in California.—Proc Soc Experim Biol & Med 1935 May Vol. 32 No 8 pp 1290-1292.

A demonstration of the transmission of relapsing fever in California by a new species of *Ornithodoros* *O. hermsi* collected from near Lake Tahoe Big Bear Lake and various other localities in San Bernardino Eldorado and Placer Counties, California at elevations ranging from 5 000 to 8 000 feet.

The ticks were found to be naturally infected with the Californian strain of *S. recurrentis* and susceptible animals (mice or monkeys) on which these ticks were fed showed spirochaetes in the blood after various incubation periods.

E H

TOKURA (Noboru) Experimentelle Studien ueber die sogenannte Gehirn und Organpersistenz der *Spirocheta recurrentis* Duttoni unter dem Einfluss vom Alkoholismus. [Experimental Studies on the Persistence of So-called Brain- and Organ-Infections of *Spirocheta recurrentis* under the Effect of Alcohol.]—Reprinted from Acta Dermat 1933 Vol. 21 No 1-2 pp. 1-27 With 4 coloured figs. on 1 plate. [37 refs.]

The author has studied the behaviour of a strain of *S. duttoni* in two varieties of mice. One of these varieties known as the T-mice had a body weight of approximately 15 gm. and was resistant against the infection (mortality about 16 per cent) whilst the other variety the F-mice had a body weight of about 10 gm. and was much more susceptible with a mortality of about 84 per cent.

One hundred and twenty T-mice were given daily doses of 0.3 cc. of 15 per cent. alcohol intraperitoneally and after 10 days treatment were inoculated intraperitoneally with a strain of *S. duttoni*. 120 F-mice were kept as controls and inoculated without being exposed to the effects of alcohol.

Five mice of each group were killed daily and examined for infectivity and also microscopically especially the brain liver spleen and kidney.

The results are given in detail and support the view advanced by the author that residual spirochaetes remain in the blood. Even at the height of the infection it was very rare to find them in the brain tissue but they might be found in large numbers in the capillaries, not only of the brain but also of the liver kidney etc. These organs were also found to remain infective after the disappearance of the infection from the circulating blood. The spirochaetes are considered to persist in blood islands of the smaller capillaries, resulting from thrombus formation.

The mice exposed to alcohol were found to show blood infection at least 10 days longer than the control mice, and the infectivity of the brain and organs persisted about 10-15 days longer than in the controls. This, however, is not the result of any nerve poisoning as suggested by Slezova [see this Bulletin 1931 Vol. 23 p. 735], since there is no evidence that this spirochaete possesses any neurotropic affinities.

E H

VON JAXCSÓ (N.) & NOVÁK (E.) Mikrobiologische Grundlagen der chemotherapeutischen Wirkung. III. Mitteilung. Die Bindung chemotherapeutisch verabreichter Goldverbindungen durch verschiedene Arten von Rekurrenzspirochäten. [The Microbiological Basis of Chemotherapeutic Action. Part III. The Combination of Therapeutically Administered Gold Compounds with Various Species of Recurring Fever Spirochaeta.]—Zent. f. Bakteriol. I Abt. Orig. 1935 June 14 Vol. 134 No. 3/4 pp. 159-169 [12 refs.]

Rats and mice infected respectively with strains of *Spirochaeta recurrentis* and *S. subksiensis* were treated with various gold compounds and the spirochaetes subsequently examined for the presence of combined gold using the microscopic methods developed by the authors [see this Bulletin 1935 Vol. 32, p. 596].

The authors strain of *S. recurrentis* showed a very marked tendency to take up gold from such diverse compounds as triphal, krysolgan, solganal A and B and potassium gold cyanide. The union of the gold compounds with the parasite was reversible, however and by repeated washing of the spirochaetes with fresh serum the gold could be removed.

In the case of *S. subksiensis* the tendency to take up gold was very slight for spirochaetes from infected rats treated with maximum doses of either solganal A or B gave negative gold reactions after ultracrySTALLIZATION, showing that the organisms were impervious to these gold compounds. Since the bodies of these spirochaetes contained no gold the only possibility is that the gold compound is attached to the surface of these organisms, perhaps by a kind of monomolecular and reversible absorption process which could not be detected by the methods employed. The results are all the more difficult to understand since infections of *S. subksiensis* are more susceptible to treatment with gold preparations than infections of *S. recurrentis*. The reversibility of the reaction suggests that the fixation of the gold is not by

means of chemo-receptors but is rather of the nature of an adsorption phenomenon.

Discussing these results it is pointed out that chemotherapeutic action in the strict sense of the word may occur without any parasitotropic fixation. The distinction however between localization of medicament in the body of the parasite or only on the surface is not very great although theoretically the latter might be interpreted as a case in which the drug acts only through the defence mechanism of the host. In the authors opinion the view that the chemotherapeutic treatment of spirochaetal infections depends on the activation of the natural defence mechanism of the host is founded on insufficient experimental evidence

E H

LEVADITI (C) & DEUTSCH (V) Action du rayonnement total de la lampe à mercure sur le virus récurrentiel. [The Action of the Total Rays from a Mercury Lamp on the Virus of Relapsing Fever]—*C R Soc Biol* 1935 Vol. 119 No 22 pp 679-681

A note on the different susceptibilities of various stages of relapsing fever spirochaetes to the total rays from a 500 watt mercury lamp. The ordinary spiral forms occurring in the blood of infected mice were found to require an exposure of about 20 minutes at distances of 15 to 38 cm. in order to destroy their virulence whilst the invisible phase occurring in the central nervous system of mice including residual brain infections up to 57 days after the initial infection and also the brains of mice killed whilst spirochaetes were still present in the blood, were both found to be very susceptible to the rays being killed after exposures of 30 and 60 seconds of irradiation.

[It is difficult to understand how an emulsion of the central nervous system of a mouse containing spirochaetes in its blood could fail to include some of the ordinary blood forms (*état végétatif*) which are stated to be resistant to the action of rays. Consequently the inactivation of such an emulsion by exposures of only 30 and 60 seconds instead of the much longer periods required by infected blood suggests that the nature of the suspension fluid may have influenced the results.]

E H

MARCHOUX (E.) CHORINE (V) & KOECHLIN (D) Infection et immunité conférée par les spirochètes des poules en cultures artificielles. [Infection and Immunity conferred by Fowl Spirochaetes in Artificial Cultures]—*C R Soc Biol* 1935 Vol. 119 No 27 pp 1280-1281

The authors have tested the results of inoculating fowls with various numbers of fowl spirochaetes that had been isolated for 6 months. 48 hour cultures were invariably used and the number of spirochaetes in the suspension estimated by means of a haemocytometer.

Seven fowls were inoculated respectively with doses of 50 000 10 000 5 000 3 000 1 000 500 and 100 culture spirochaetes. Inoculation of 5 000 or more produced typical infections the two fowls inoculated with 3 000 and 1 000 developed immunity without any signs of infection, although the one receiving the higher dose showed

a rise in temperature from the 3rd to the 9th day whilst those inoculated with fewer than 1,000 spirochaetes were neither infected nor developed any immunity

E H

SCHÄFER (Berta) Ueber die Feststellung von Dickenunterschieden an lebenden mikroskopischen Objekten dargelegt am Beispiel der Unterscheidung von Hühner und Rekurrenzspirochäten. [The Determination of the Thickness of Living Microscopic Objects, based on the Examination of Fowl and Relapsing Fever Spirochaetes.]—Arch. f. Protistenk. 1935 Vol. 85 No 1 pp. 87-99 With 3 figs. [23 refs.]

The author finds that it is possible to distinguish three degrees of thickness in spirochaetes by the use of different types of condenser. When a film of living *Spirochaeta recurrentis* is examined under the microscope, using e.g. a Zeiss X-apochromatic objective (x80) and an ocular x10 or x15 if the film is illuminated by means of a Cardioid condenser with a high numerical aperture (e.g. a Stiedentopf Cardioid condenser) the spirochaetes show a curious optical phenomenon, each appearing as two parallel bright lines separated by a dark line.

If one uses a dry condenser however the spirochaetes lose this double contour and appear as single bright lines. In addition to *S. recurrentis* (European strain) five other strains of relapsing fever (*hispanica subsistens*, *ditionis angola* and *crocidurae*) gave similar results, also a strain of *S. acovi*. On the other hand, two strains of the recently created *S. berkeleyi* [see this Bulletin 1934 Vol. 31 p. 88] showed very indistinct doubling of the contour indicating that they were more slender than *S. acovi*.

When *S. gallinarum* is similarly examined the spirochaetes appear only as single bright lines, there being no suspicion of any double contours. Spiral organisms thicker than *S. recurrentis*, such as *Spirillum rubrum* Eschweiler, show a double contour even when examined with a dry condenser.

No spirochaetes, except the relapsing fever group were found to show the two appearances with the two types of condenser so this furnishes a simple and reliable method of determining the approximate thickness of fine objects under the dark ground.

E H

RAT BITE FEVER.

SCHÜTZEL (Alfred) Ueber die bei einem Fall von Rattenbisskrankheit in Rostock 1931 als Erreger nachgewiesenen Spirillen (*S. muisus*). [The Demonstration of Spirilla (*S. muisus*) from a Case of Rat Bite Fever in Rostock, in 1931].—Zeit f. Bak. I Abt. Orig. 1935 July 23 Vol. 134 No 5/8. pp 302-305. With 2 figs.

The description of a typical case of the disease in a child bitten on the hands and arms by a rat. The symptoms developed 18 days later and spirilla were isolated from the blood and lymph glands and the infection transmitted to mice, rats and guinea-pigs. The patient's blood gave a positive Wassermann reaction [with syphilitic liver extract] and infected guinea-pigs also gave positive reactions with

syphilitic antigens and complement fixation with extracts of the organs of mice infected with *S. minus*. The serum of infected mice did not show the development of any antibodies against the parasite. According to the author this is the first case of rat bite fever recorded in Germany in which the causative agent has been isolated.

E Hindle

OZEKI (Yaichiro) Ueber die durch die *Spirocheta morsus muris* erzeugte Veränderung des Augenlides bei Maus Anhang Ueber den Haarausfall bei Maus durch *Spirocheta morsus muris* [The Changes produced by *Spirocheta morsus muris* in the Eye-lids of Mice. Appendix The Loss of Hair in Mice caused by *S. m. muris*]—Japanese Jl Dermat & Urol 1935 May Vol. 37 No 5 [In Japanese pp 615-638 With 21 figs. (3 coloured on 1 plate) [47 refs.] German summary pp 109-112.]

Animals infected with rat bite fever frequently show changes in the skin surrounding such openings as the eyes mouth anus etc. and the author has studied this phenomenon in the case of the eyelids of mice. The changes developed at varying intervals after the inoculation 28 days in 4.9 per cent. 33 days in 18.5 38 days in 25 52 days in 27 and 63 days in 19.2 per cent of the cases.

The spirilla were found to invade the skin about 14 days after the inoculation and to be especially abundant in the subcutaneous vessels and corium. The numbers of parasites increase and this is accompanied by marked cellular infiltration which interferes with the general circulation, including that of the hair follicles with the resulting loss of hair. About 40 to 50 days after inoculation the mouse generally develops an immunity and the spirilla disappear but the cellular infiltration persists for some time afterwards. E H

LEPTOSPIROSIS

KOTORII (Saigo) Zur Klinik der sogenannten Hasamiyami. (Wellähnliche endemische Krankheit.) [The Clinics of So-called Hasamiyami. An Endemic Disease of the Well Type]—Klin Woch 1935 Aug. 10 Vol. 14 No 32 pp 1147-1149

An account of Hasami fever an endemic disease of the Weil type occurring in the Hasami district, near Nagasaki, based on the study of 418 cases treated in the author's private clinic between 1903 and 1934. The disease is identical with Akiyami and Autumn fever the aetiological agent being *Spirocheta autumnalis*.

The author gives details showing that nearly all the cases of the disease occur in the autumn months of August September and October. The general symptoms are sudden fever with rigors severe headache muscle pains and digestive disturbances. The most important characteristics are inflammation of the conjunctiva and of the throat jaundice subcutaneous haemorrhages swelling of the lymph glands albuminuria and leucocytosis. E Hindle

KANEKO (Kōkichi) KOTORII (Salgo) AOKI (Yoshio) MORIMOTO (Tsutomu) Weitere Studien ueber die "Hasamiyami." I. Statistische Betrachtungen der im Distrikt Hasami gefangenen, spirochätentragenden Feldratten. [Further Studies on "Hasamiyami." I. A Statistical Consideration of the Wild Rodents carrying Spirochaetes in the Hasami District.] [KANEKO Kotorii & AOKI] Ztschr f Hyg u Infektionskr 1935 July 18. Vol. 117 No 2 pp 202-207 With 3 figs. II Vergleichende Untersuchungen ueber die Methoden zum Nachweis des Erregers von "Hasamiyami" (Spirochaeta autumnalis) im Rattenkörper. [II. A Comparative Investigation of the Methods of finding the Causative Agent of "Hasamiyami" (*S. autumnalis*) in the Body of the Rodent.] [AOKI KANEKO & MORIMOTO] —ibid pp 208-215 [22 refs.]

I. The authors have examined 1930 rodents captured in the Hasami District between July 1932, and September 1933. About 11 per cent were found to be carrying a spirochaete belonging to the strain Akiyami A. (= *Sp. autumnalis*). The occurrence of the spirochaetes in the four species examined is shown in the following table —

Species of rodent	No. examined	No. positive	Percentage	Sex	Percentage
<i>Rattus r. norvegicus</i>	444	0	0	—	—
<i>R. rattus alexandrinus</i>	33	0	0	—	—
<i>Apodemus speciosus</i>	1428	209	14.7	♂ 137 ♀ 72	16.7 11.8
<i>Micromys minutus</i>	22	1	4.5	♂ 0 ♀ 1	8.3
TOTAL	1930	210	10.9	♂ 137 ♀ 73	13.1 8.3

A total of 298 rodents collected in houses in the same district were also examined, but were uniformly negative. They belonged to three species, *Rattus norvegicus norvegicus*, *R. rattus alexandrinus* and *Saccostomus caeruleus* var. *rissoanus*.

From these results it would seem that the field mouse *Apodemus speciosus* is by far the most important carrier of the infection and this view is supported by other evidence. The spread of the infection amongst the captured rodents was strikingly shown by the examination of animals that had been kept together in cages for periods of 10, 20 and 30 days respectively which showed percentage infections of 8.0, 15.1 and 43.5. The influence of age is shown in a curve giving the incidence of infection corresponding to body weight from which it appears that the percentage of infected animals, both males and females, rises until they are full grown, with a body-weight of 51-58 gm. and falls very suddenly in animals above this weight. The spirochaetes occur mainly in the kidney and urine only one in ten of the infected animals showing a positive liver.

II. The authors examined 50 *Apodemus speciosus* from the Hasami district for spirochaetes using various methods in order to determine

which was the best. Their results are given in the following table in which the figures indicate the number of positive findings out of the 50 examined —

Microscopical methods			Guineapig inoculation	Culture method	Immunity reaction	
Dark ground	Stained Mahl plöndt Ruge	Stained Levaditi			Agglutination	Adhesion
14-28%	12-24%	10-20%	18-32%	20-40%	18-36%	43-83%

The culture method seems to give the best results but it is necessary to have fresh material.

The results of the agglutination tests did not always agree with those obtained by culture for 7 mice contained spirochaetes and gave negative agglutination tests whilst 5 mice were serologically positive but gave negative cultures. It is probable that in one group the infections were too recent for the development of antibodies, whilst in the other group the antibodies had persisted in the blood after the disappearance of the infection. The adhesion test was found to be very unreliable giving positive reactions in a large number of cases not only with the strain under examination but also with *S. icterohaemorrhagiae* *S. hebdomadis*, another strain of *S. autumnalis* and also with the water spirochaete *S. biflexa*

E H

HASLÉ (G) TOULLEC (F) & VAUCEL (M) Spirochétose ictériogène au Tonkin. [Spirochaetal Jaundice in Tonkin]—Bill Soc Path Exot 1935 July 10 Vol 28 No 7 pp 551-553

A record of three cases of Weil's disease two European and one native occurring during September 1934 at Hanoi.

One case showed meningitic symptoms and general septicaemia of *Bac. coli* and died after 18 days. A guineapig inoculated with cerebro-spinal fluid from this case showed a typical infection with *S. icterohaemorrhagiae*. The other two cases were benign but all three showed spirochaetes in the urine after the 10th day of illness. The inoculation of the centrifuged deposit from these urines however failed to infect guineapigs. Blood examinations of the two survivors only once showed the presence of immunisms but both gave strongly positive sero-agglutination reaction.

Out of 142 local rats examined only four were found to be infected with *S. icterohaemorrhagiae*.

E H

MARCHESI (Franco) The Spirochaeta of Infective Haemorrhagic Jaundice found in Rats in Rome.—Jl Trop Med & Hyg 1935 Sept. 2 Vol 38 No 17 pp 213-214 [22 refs.]

The author isolated three strains of *Spirochaeta icterohaemorrhagiae* from rats caught in Roman sewers. Inoculated into guineapigs the spirochaete produced typical symptoms of Weil's disease. The organisms were found to be capable of living up to seven days in filtered Tiber water and therefore there is danger of the transmission of the disease from rats to man by means of the river waters. E H

UHLERNHUTH & ZIMMERMAN. Zur Epidemiologie und Therapie der Weilschen Krankheit. [The Epidemiology and Treatment of Weil's Disease.]—*Zent. f. Bakteriol.* I Abt. Orig. 1935, Vol. 135, No. 1/3. Beiheft pp. 151*-154*

A general account of the subject.

With reference to the occurrence of the disease in dogs up to the present the authors have examined the sera of 67 individuals and found that 15 per cent. gave positive reactions against the ordinary strain of *S. icterohæmorrhagias*. In addition to this strain, dogs may also be infected with the *cunicula* strain discovered by SCATTERER [see this *Bulletin* 1934 Vol. 31 p. 833] and this type also may be infective to man.

The use of either convalescent serum, rabbit anti-serum or bismuth compounds is recommended for treatment.

E. H.

SPRUCE.

REED (Alfred C) & JOHNSTONE (Herbert G) A Clinical Study of Intestinal Fungi.—*Amer Jl Trop Med* 1935 Mar Vol 15 No 2 pp 155-174 [11 refs.]

In spite of or perhaps we may say because of the negative findings this article is of considerable importance. The authors have examined by cultivation the stools of 50 patients suffering from various diseases to determine the nature of any fungi present and to establish if possible the relation of the fungus to the disease whether as cause or as secondary invader and also their pathogenic relationship.

Of the fifty 24 had no fungi 24 showed evidence of amoebiasis 15 had chronic diarrhoea, 7 were cases of sprue. It is strange to find how evenly divided were those with and those without fungi. Thus of the 24 with amoebiasis 12 were positive and 12 negative of the 15 with chronic diarrhoea, 7 were positive 8 negative of the 7 sprue patients 4 were positive. Among the four positive sprue cases Type III Monilia, *M candida* was found in three and a Torula in the other. Country of previous residence seemed to have little if any influence. Thirteen had lived in California 6 were positive 7 negative 13 had visited or lived in Europe 7 were positive 6 negative 15 had lived in the Far East their respective figures were 8 and 7 25 had lived in the United States 13 were positive. It was only in the group of 10 who had lived in Central or South America that positives preponderated, 8 to 2 negative.

Some type of Monilia was the fungus most often isolated. The authors come to the conclusion that in no case were they convinced that there was any pathogenic relationship between the fungus and the disease it may have modified the symptomatology but though possible this is difficult to prove. H H S

MACKIE (Thomas T) & POUND (Robert E) Changes in the Gastro-Intestinal Tract in Deficiency States with Special Reference to the Small Intestine a Roentgenologic and Clinical Study of Forty Cases.—*Jl Amer Med Assoc* 1935 Feb 23 Vol 104 No 8 pp 613-618. With 8 figs [10 refs.]

Defective absorption is an outstanding feature in sprue and may affect the development of the deficiency factors of this disease. The authors have observed signs of advanced deficiency disease in several cases of ulcerative colitis such as the affections of the tongue and buccal mucosa (as in sprue pellagra and pernicious anaemia) the skin changes (as in pellagra) oedema and reduction of blood calcium, etc. The association of these deficiency states with chronic ulcerative colitis has led the authors to think that they may be aetiologically related, while too rapid passage of food or abnormalities of the small intestine would lead to defective absorption.

They have studied radiologically after a barium meal 37 cases of chronic ulcerative colitis and three of sprue. Nine of the former gave good evidence of infection by some strain of *Bact. dysenteriae* and six others agglutinated stock strains to diagnostic titre. From their observations of the progress of the barium meal the authors deduce varying degrees of oedema of the mucosa derangement of the normal motor function and abnormal variations in tone of the intestinal musculature. The pathological conditions at the base of these

changes are not definite. Theses were obtained from four of the cases but no inference of any value could be made from them. There were however marked similarities in the roentgen changes as observed in the colitis and the sprue cases although in two of the latter the disease was quiescent at the time. The authors note, however, that it is impossible at the present time to state whether the small intestine changes are a factor in the production of the deficiency state or the result of such states. [One of the three cases of sprue was noted in this *Bulletin* 1935 Vol. 32 p. 44.]

H H S

MACKIE (T. T.) MILLER (D. K.) & RHOADS (C. P.) Sprue Roentgenologic Changes in the Small Intestine.—*Amer Jl Trop Med* 1935 Sept. Vol. 15 No. 5 pp. 571-589 With 4 figs. [14 refs.]

Recent work on sprue tends to favour the theory that insufficient intake of food, or defective absorption or inadequate utilization of it or a combination of these takes part in the aetiology or pathogeny of the condition. The symptoms of sprue—the stomatitis, the diarrhoea, the anaemia not infrequently improve greatly on the parenteral administration of liver extract when oral administration fails. This is strongly suggestive of malabsorption of the extract and by parity of reasoning lack of absorption of certain food essentials.

The authors give in the letterpress of their article and in tabular form the results of X-ray examination immediately after and at half-hourly or hourly intervals after 4-oz. barium meals taken by 17 sprue patients. They noted the calibre variation of the intestine, its segmentation and "pocketing" the time taken for the meal to reach the caecum and the barium residue in the small intestine. They found that the outline was often abnormal and that localized segments filled and formed pockets like diverticula, while in the lower ileum the outline might be straightened suggesting lack of pliability of the [intestinal] wall. They found no evidence radiographically of ulceration. Five of the patients were similarly examined at intervals when improvement was taking place following treatment and the changes detailed were observed to be less marked.

CASLE, HEATH and STRAUSS have recorded a lack of the gastric anti-anaemic principle and abnormal states of the intestine have as is well known, been found in experimental avitaminosis. Although the findings mentioned above seem quite definite by X-rays, it is not yet possible to gauge their importance in the pathogeny of sprue for there is no definite proof post-mortem of any characteristic lesions. But we may say that this very absence of local reaction histologically is evidence against the local infection theory while consistent with that of defective absorption. Details of the five patients re-examined are given. The authors sum up their conclusions in the following words—

- 1 Characteristic changes in the small intestine have been demonstrated by X-ray in seventeen cases of sprue.
- 2 Similar changes have been observed in other conditions exhibiting clinical evidence of multiple deficiency states.
- 3 The intensity and extent of the abnormalities in the small intestine vary directly with the severity of the clinical picture in sprue, and they regress under specific therapy.
- 4 It is suggested that they may play a part in the defective absorption or utilization of essential food factors.

H H S

PILLAI (M. J. S) & MURTHI (K. N) Further Observations on the Radiological and General Findings in Sprue—*Calcutta Med Jl*
1935 Oct Vol 30 No 4 pp 225-230

In 1931 the authors published a paper on Radiological Signs in Sprue [see this *Bulletin* 1932, Vol. 29 p 8] and now report other cases examined in the same way. Of 14 cases 8 showed evidence of diverticulitis of the large intestine while the upper part of the alimentary tract was free of inflammation i.e. what they regard as the ascending type. The remainder of the paper is concerned with discussion largely hypothetical on the way in which the condition and associated lesions may be set up by endocrine or toxic action but since there has not yet been an opportunity to verify these suspicions by autopsy there is no need at present to consider them more fully H H S

NICHOLLS (Lucius) Sprue and Vitamin Deficiency—*Ceylon Jl Sci*
(Sect. D Med. Sci) 1934 Dec 8. Vol 3 Pt 3 pp 173-176

The author's views on sprue are given in his summary of this paper —

The pathology and clinical course of sprue are those of a deficiency disease. The deficiency is not in the diet, but is due to various causes producing a preliminary damage of the epithelium of the small intestine which lowers its capacity to absorb the necessary vitamins and this may lead to impairment of the metabolic assimilation.

He believes that it is not the lack of vitamins especially vitamin A in the diet but lack of absorption of it that is the prime cause or that a disordered metabolism may prevent the normal assimilation of vitamins after absorption. No fresh evidence is adduced and the theory leaves unexplained the peculiar geographical distribution of the disease and more important the long latent period 10 years or more which may elapse after a person has left the tropics before symptoms appear when during that interval he has been living under excellent conditions.

H H S

VAN STEENIS (P. B) Tropische sprue zwangerschap en eczeem.
[Sprue Eczema as a Complication of Sprue in Pregnancy]—*Nederl Tijdschr v Geneesk* 1935 May 4 Vol 79 No 18 pp 2062-2072 [18 refs.] English summary

The summary runs thus —

"Among 38 cases of sprue in women 33 of whom were married and in the age-period of child bearing 12 occurred during pregnancy (36 pCt.) Eight of these were primary cases of sprue in pregnancy 4 recurrences of pre-existing sprue during pregnancy. The symptoms appeared mainly after the 8th month after delivery in general recovery or marked improvement set in.

Sprue of pregnancy does not differ materially from other cases in its symptoms. As a complication in 4 of the 12 cases eczema was noticed appearing respectively in the 7th month 8th month of pregnancy 10 days respectively 2 months after delivery. In the first three patients it was much generalised on the trunk extremities and genital area and subsided soon after delivery. Neither in sprue nor in pregnancy is eczema a common complication.

MULLER (P.) Bepaling van de hoeveelheid vet in faeces. [Determination of the Fat Content of Faeces.]—*Nederl Tijdschr t Geneesk* 1935 Aug 17 Vol. 79 No 33 pp 3900-3902 English summary (8 lines)

Under the methods in customary use for determination of saponified and unsaponified fat in the faeces the specimen has to be dried as a preliminary. This is a tedious procedure and obviated by that described, in which acidified acetone is employed as the first extraction fluid. The acetone is then distilled off and the residue shaken with petroleum ether as the second extraction fluid. Thereafter the usual procedure of drying, weighing and titrating is followed. For actual details the original should be consulted. A table of results comparing the total fats and fatty acids by the acetone and the ether methods in several cases is given which shows that the two correspond very closely

H H S

FAIRLEY (N. Hamilton) Tropical Sprue and its Modern Treatment.—*Brit Med Jl* 1934 Dec 29 pp. 1192-1194 With 1 chart

This paper was read at the meeting of the Tropical Medicine Section of the British Medical Association held last year and sums up very clearly our present knowledge regarding the treatment of sprue and the most recent views as to its aetiology. The chief laboratory findings and points of importance in differential diagnosis are stated with the authority of one who has made an intensive study of the subject. The author after mentioning views on aetiology which are now of little more than historical interest—those of ASAFORD, FLINCKS, and SCOTT—gives his opinion that sprue arises as a functional breakdown in the gastro-intestine and that any factor or factors depressing its secretory or absorptive function will predispose, and he mentions malaria and dysentery as possible depressors of gastric secretion. This, of course, as the author would probably be the first to concede, does not clear up the vexed question of the aetiology of sprue, but merely throws the problem back and leaves unanswered the questions why this condition of depression of gastric secretion or alimentary function occurs to a small proportion only of persons subjected to similar conditions of environment and régime and why the onset of symptoms is sometimes delayed for years after removal from such environment.

Dr Fairley gives details of the high protein low fat, low carbohydrate diet or graded diets which have proved so successful in his hands and of the use of liver extract *per os* for the anaemia. He has rarely found it necessary to have recourse to the parenteral administration of liver.

He gives an example of a sprue patient who after repeated attempts, failed to respond to liver therapy *per os* but whose blood showed active and rapid regeneration after intramuscular injections (6 cc.) of campolac [a preparation of liver extract]. He does not omit to mention the need for care in diet and routine after cure to guard against relapse. H H S

Castle (W. B.) RHoads (C. P.) LAWSON (H. A.) & PAYNE (G. C.) Etiology and Treatment of Sprue. Observations on Patients in Puerto Rico and Subsequent Experiments on Animals.—*Arch Intern Med* 1935 Oct. Vol 56 No 4 pp. 627-698 With 6 charts. [136 refs.]

This is a long paper dealing not only widely but also deeply with the subject. It is too full and too detailed for any abstract adequately

to do it justice and it should be read in the original by those interested. It would form an excellent chapter in a treatise on tropical medicine and with its 136 references omits little of real importance which has been written on sprue since HILLARY's classic appeared in the latter half of the eighteenth century. The authors take up in turn the history of sprue the aetiology and clinical picture describing and discussing the symptoms the blood and marrow changes the relations between sprue, pellagra and pernicious anaemia. [In the reviewer's opinion too much is made of possible relation and resemblance to pellagra to those who have practised in the tropics the conditions are clinically so distinct that to insist on the few points of similarity tends rather to confuse the issue. Experimentally in animals regulation of diet can result in stomatitis salivation diarrhoea and in some instances dermatitis. It appears to us however that if the cutaneous lesions are excepted the resemblance of these conditions to pellagra is no greater than their resemblance to sprue. Quite so or even poisoning by mercury] To treat seriously in these days the Monilia theory is but thrashing a dead horse. The authors give an excellent account of the possible combination of the three factors in aetiology extrinsic of dietary origin intrinsic in the gastric secretion or the lack of them and defective absorption. The analogies between the anaemia of sprue and pernicious anaemia are well presented and the treatment especially by liver is considered at length.

The conclusions are best given in the authors own words —

It is believed, therefore that in sprue as in pernicious anaemia there is involved the failure of a reaction between an extrinsic factor in the diet associated in several substances with vitamin B₁₂ (G) and an intrinsic factor present in the gastric contents of the normal person. In addition difficulty with the absorption of substances from the intestinal tract resulting from this hematopoietic reaction is probably involved in certain instances of both diseases. In different patients with sprue the relative importance of these mechanisms is variable. Sprue with macrocytic anaemia thus arises from the variable participation of three defects of the extrinsic factor of the intrinsic factor and of absorption. Dietary deficiency of iron gastric anacidity and intestinal impermeability may also decrease the normal intake of iron.

By means of diets deficient in sources of the extrinsic factor or closely related substances, lingual and gastro-intestinal lesions macrocytic anaemia with megaloblastic bone marrow and degenerative lesions of the spinal cord have been produced in animals. These manifestations can be abolished by means of liver extract or the extrinsic factor. The gastric secretion of pigs fed appropriately defective diets loses its normal content of the intrinsic factor and the liver becomes deficient in substances normally present and capable of producing increased formation of blood in cases of pernicious anaemia. Therefore the disease picture in animals may reasonably be regarded as analogous to that in patients with sprue. Appropriate dietary defects in man may likewise initiate the physiologic disturbances of the alimentary tract subsequently involved in the production of sprue.

The evidence for the primary etiologic relationship of yeastlike organisms to sprue is not convincingly supported by observations on animals or on man.

The administration of adequate doses of liver extracts effective in pernicious anaemia especially by parenteral injection is fundamental

in the treatment of sprue and its macrocytic anaemia. The accessory use of iron is indicated for certain patients.

It is emphasized that adequate doses of liver extract are as important in controlling the manifestations of the alimentary tract as in promoting the formation of blood in cases of sprue H H S

BROOKS (Gilbert E.) Tropical Aphthae, or Sprue, and Its Treatment.—
Jl Trop Med & Hyg 1935 Feb. 1 Vol. 38. No. 3
pp. 29-33.

This article starts with a fairly comprehensive summary of the theories which have been brought forward since the beginning of the century as regards the aetiology of sprue this is followed by a few remarks on pathology symptoms and treatment as gleaned from the literature.

The author makes yet another suggestion as to causation, namely a predisposition brought about by deficiency in vitamins A and G and on the top of this an infection possibly conveyed by cockroaches—a sort of half-way house to the termite theory.

The author who has himself suffered from sprue ends with a detailed description of the diet which he has found suitable in his own case and which with the magnanimity characteristic of dieticians in general and sprue subjects in particular he here communicates for others to try. For the ingredients and modes of preparation of the food the original paper must be consulted full details are given

H H S

VAN PRAAG (André) Données nouvelles sur la sprue nostras. (Non-Tropical Sprue).—*Bruxelles M&L*. 1935 June 2. Vol. 15. No 31 pp 843-852 [15 refs.]

This forms an interesting addition to the growing list of cases of non-tropical sprue.

The patient was a woman of 32 years unmarried, a dressmaker who had enjoyed good health until two years before she consulted the author. She had never been outside Europe. Her symptoms were diarrhoea with pale bulky frothy stools, starting at 5 or 6 a.m. and continuing at intervals during the morning. For 18 months she had had sore tongue and a burning sensation in the mouth. She had lost 20-25 kgm. in weight, and the abdominal distension contrasted with the general wasting. The stools were characteristic, both macroscopically and microscopically. Blood examination gave red cells, 2,510,000 white 6,000 per cmm. Hb. 85 per cent. C.I. 1.7 Calcium 8.2 mgm. per cent. Chvostek's sign was present.

She was placed under a mixture of treatments which makes it difficult to gauge which was responsible for the improvement that followed. She was kept in bed, dieted with fruit alternating with milk and twice weekly the juice of 1 lb. of meat. Calcium was given by mouth parathyroid by injection followed by Pernamen. With the exception of a slight relapse due probably to diet indiscretion, progress was uneventful, and in 5 months she had gained 8 kgm. in weight, stools were reduced to two on rising blood calcium was 9.3 per cent. and the patient left saying that she felt perfectly well.

H H S

ENNEKING (J. A. M. J.) Een genezen geval van inheemsche sprue met spontane fracturen [A Cured Case of Home Sprue with Spontaneous Fractures.]—*Nederl Tijdschr v Geneesk* 1935 June 29 Vol 79 No 28. pp 3175-3185 With 2 figs. [21 refs.] English summary (7 lines)

The syndrome which comprises fat diarrhoea hyper or hypochromic anaemia, osteoporosis and tetany has with increasing frequency been described as non tropical sprue. Such a case in a shoemaker of 59 years who had never been in the tropics is given in detail and is here briefly summarized —

Symptomatology—On admission in the autumn of 1933 the patient showed emaciation with good appetite symptoms of tetany which did not diminish on administration of calcium lactate and diarrhoea which was not influenced by diet. Stools 4 daily voluminous thinly paleaceous offensive yellow and fatty becoming definitely sprue-like

Examination—Marked calcium deficiency in all bones as estimated by X ray and fractures of the 4th 5th 6th and 7th ribs. Skin dry and slightly yellow mucosae slightly anaemic no icterus Tongue neither glazed nor red originally but later pain in and vesication of mouth and tongue Blood pressure 105/70 Urine trace of albumin no glycosuria, no Bence-Jones protein, much urobilin many hyaline and some granular and leucocyte casts Temperature normal. Weight 41.2 kilogram, height 1.56 metres. Wassermann negative A fractional test meal showed complete absence of hydrochloric acid and a total acidity of 5 to 7 The blood showed hyperchromic anaemia (erythrocytes 1 600 000 Hb 60-70) anisocytosis poikilocytosis slight polychromasia many nucleated red cells (68 per 200 leucocytes) slight leucocytosis, normal differential count and increased sedimentation rate (1 hr 34 2 hrs 72) Calcium content of the blood serum 4 to 5 mgm. per cent. and inorganic phosphorus content 2.25 mgm. per cent. On a diet which should have shown 100 mgm. calcium in the urine there was excreted only 25 mgm. Bilirubin content of the blood serum increased (0.006 mgm/cc.)

Treatment—At first 200 gm. raw liver daily made up with salad and tomatoes 10 mgm. calc. lactate in wafer twice daily combined with 15 drops davitamon hydrochloric acid pepsin and fat-poor diet with good result. Subsequently general ultraviolet irradiation and further improvement. Finally 5 drops davitamon once every 3 days chalk powder 3 times daily and one injection of liver every 14 days

Result—In February 1935 Pain disappeared. Fractures healed. Still achlorhydria and no free hydrochloric acid. On subcutaneous injection of histamine there occurred abundant gastric secretion and 1 hr later there was hydrochloric acidity of 62 and a total acidity of 75 Weight 52.5 kilogram. Urine had become normal. Stool once daily and appeared normal with only a little neutral and split fat (microscopically). Blood picture nearly normal. General condition excellent. Could walk for hours without any complaint. The calcium content of the blood had increased to 9.1 mgm. and the phosphorus to 3 mgm. per cent. [The constitution of davitamon is not stated.] *W F Harvey*

SWEZL (Albert M.) Clinical Observations on Non Tropical Sprue—*Southern Med J* 1935 June Vol 28. No 6 pp 516-520 [26 refs.]

MINDLINE (J) & ROSENHEIM (M. L.) Duodenocolic Fistula simulating Idiopathic Steatorrhoea.—*Lancet* 1935 Oct 5 pp 764-767 [24 refs.]

The authors describe the case of a man of 43 years who 24 years before had served in India and had had malaria but no other illness. He was admitted to hospital with fever (up to 102°F) and was passing

pale, semisolid stools, which showed excess of fatty acids, but not of soaps or neutral fats. Blood count gave 4½ million red cells, 9,200 white per cmm. Hb 80 per cent. blood calcium normal. He left hospital with some improvement in a month but returned 6 months later with low blood pressure loss of weight (18 lbs.) pallor distended abdomen, ascites and was passing 2-4 pale, bulky paleaceous stools daily. The liver edge was palpable. The anaemia was more marked than at his previous admission to hospital red cells 3½ million of macrocytic type, white 13,000 haemoglobin 69 per cent., blood calcium still normal. He gave a history of faecal vomiting. The diagnosis was thought to rest between idiopathic steatorrhoea [*i.e.* non-tropical sprue] or abdominal tuberculosis or neoplasm. Ascites increased and recurred repeatedly after paracentesis. Operation was undertaken and a carcinoma of the hepatic flexure of the colon was found. The patient died and at autopsy a large growth of the flexure was observed to have ulcerated through to the duodenum. Other cases, in several points similar to this are referred to by the authors [see also this Bulletin 1930 Vol. 27 p. 1024 1932, Vol. 29 p. 483].

H H S

Rouxgez (E.) & Boissier (C.) Untersuchungen an hyperchromen Anämien bei experimentell erzeugten sprueartigen Erkrankungen. [Hyperchromic Anaemia in Sprue-like Conditions experimentally produced.]—*Klin. Woch.* 1935, Feb. 2, Vol. 14 No. 5, pp. 148-150.

The authors claim to have brought about anaemia of the chlorotic type in young growing white rats by feeding them with cows' milk, and of the pernicious type by feeding with goats' milk. The former they ascribe to deficiency in iron or copper since it is curable by exhibiting these metals the latter they maintain is identical with pernicious anaemia in man because it is refractory to iron but susceptible to liver treatment.

The symptoms resulting from feeding the rats on goats' milk were "fatty stools, pernicious anaemia lipaemia and the nervous disturbances corresponding to the picture of sprue." The red cells were reduced to about a million (the normal for rats is not stated) the colour index was 1.3 there was definite leucopenia with relative lymphocytosis. Anisocytosis, poikilocytosis and polychromasia were marked and megaloblasts and normoblasts numerous. [It is not stated whether the anaemia was of the megalocytic type.] The lipaemia was marked and the blood sugar reduced by half. The "nervous symptoms" comprised muscular weakness, stiffness of limbs and even paralysis with a definite crab-like gait."

The authors call this symptom-complex "Rat sprue" and discuss its causation whether it is parasitic, infective or toxic in origin or a deficiency disease, and they lean to the idea that it arises from absence or deficiency of the anti-anæmic factor of vitamin B₁₂ and failure of adequate absorption from the intestine of the "blood regenerating factor" in the course of the fatty diarrhoea brought about by feeding with goats' milk. [The article contains too many suppositions and sprue in man is not characterized by paralysis or a crab-like gait.]

H H S

MISCELLANEOUS

DE LANGEN (C. D) Geographical Pathology—Reprinted from
A Clinical Text Book of Tropical Medicine pp 479-513 1935
 Batavia-C Surabaya Amsterdam. G. Kollf & Co

This is an excerpt from a Text Book of Tropical Medicine and aims at discussing the general diseases which are practically universal pointing out the special features which characterize them when occurring in tropical countries. Geographical pathology is a most absorbing subject worthy of a whole volume to itself and cannot be adequately treated in a chapter of 35 pages. The order of treatment is arbitrary *viz* gastric conditions ulcer and carcinoma then liver diseases cirrhosis primary carcinoma and cholelithiasis the anaemias and cardio-vascular disorders tuberculosis pneumonia renal affections glycosuria and diabetes gout and specific fevers. The rarity of gastric ulcer in the tropics is noted under the anaemias it is stated that macrocytic anaemia is in no way akin to the anaemia of sprue or pernicious anaemia and that sprue is regarded as a typical tropical disease. Sprue anaemia is of the macrocytic type and the differences should be noted between it and other forms if held to be in no way akin. Nothing is said of the so-called non-tropical sprue which should assuredly find a place in work on geographical pathology. The author's experience of tuberculosis in the tropics differs from that of those practising in other parts of the tropics. Thus he states that haemoptysis is a symptom which is present with extraordinary frequency and that it is severe and not unusually fatal. These findings are confirmed from all other tropical lands he states. On the contrary SCOTT has noted among his series of Chinese in Hong Kong that he only found three deaths from haemoptysis all adults and that no case was found among the far larger number of children and he adds It would seem that this condition does not occur in the natural disease only in the modified and tuberculosis in the tropics is in his experience largely of the natural type as opposed to the modified. The remarks on the chief infective diseases diphtheria, scarlet fever and measles consist of brief generalizations. It is nowhere stated that the author's remarks apply only to Netherland India and if he is giving his experience of that country only he is taking a very limited view of so vast a subject as tropical geographical pathology

H H S

RADSMA (W) Enkele physiologische verschillen tusschen Europeesche en inheemsche bevolkingsgroepen te Batavia. [Physiological Differences between Europeans and the Indigenous Population of Batavia]—*Nederl Tijdschr v Geneesk* 1935 June 22. Vol 79 No 25 pp 3066-3084 With 3 figs. [25 refs.] English summary

The English summary is as follows —

In the first communication of this series we described some differences which have been found in the chemical composition of the blood and the acid-base equilibrium between different European and native groups of population in Batavia.

Distinct differences were found especially between the poorer natives (servants and coolies) and the European population. The haemoglobin content, the content of cholesterol and other lipoids was lower with the

poorer natives than with the Europeans, while with the better situated natives (students) the content of lipoids in the blood was about the same as with the Europeans the content of haemoglobin somewhat higher. The amount of non-protein nitrogen and of glucose was lower with the natives than with the Europeans.

As for the acid base equilibrium, a distinct difference proved to exist between the occurrence of morning-alkaluria with Europeans and native servants. With Europeans morning-alkaluria often occurred, with the servants practically never. The results of measurements in the 24-hour urine point to a more acidotic metabolism with the servants, caused by a relatively smaller amount of fixed bases in their food. With the students the results mostly lay between those with the servants and with the Europeans. The blood of the native servants proved to be more acid than that of the Europeans.

In this second communication the probable causes of the differences are discussed.

McEWEN (O. R.) Salt Loss as a Common Cause of Ill-Health in Hot Climates. [Correspondence.]—*Lancet*. 1935. Apr 27 p 1015.

LANGDON BROWN (W.) Salt Loss as a Cause of Ill-Health. [Correspondence.]—*Ibid* May 4 p 1089.

The loss of fluid by miners and stokers working at high temperatures and the relief of resulting symptoms by the drinking of saline fluid are well recognized. Col. McEwen believes that the ill health and loss of efficiency in the white inhabitants of tropical regions in the hot season is due to the same cause, viz. a loss of sodium chloride.

Hoyer estimated the loss of fluid in the hot weather in India as 30 pints per diem. McEwen from experience in the Punjab and North West Frontier Province puts it at 12 pints with light exercise. If then the proportion of NaCl in the sweat is put as low as 0.3 per cent. (YAS KUNO) there would be lost in 12 pints some 16 gm. a day [should not this be 21.6 gm.?]. Adding 12 gm. passed daily in the urine, and 4 gm. as necessary for bodily metabolism, we have a total requirement of 32 gm. and if we take 15-20 gm. as the amount taken in food there is a deficit of some 12-17 gm. daily which might be doubled in certain conditions. Many Europeans never feel well in the really hot weather complaining of undue fatigue, lassitude, headache, sleeplessness and inability to concentrate. McEwen himself has reduced the incidence of these symptoms by increasing his intake of NaCl and he advises the drinking of physiological salt solution at full or lesser strength. Other means of increasing the salt intake are mentioned.

Sir W. Langdon-Brown refers to "functional hypo-adrenalinism" as a severe form of the condition McEwen describes. In these cases cortical extract is prescribed but perhaps salt would do as well. In this type of case achlorhydria is found, which would be explained by salt deprivation.

A G B

CULPIN (Millais) Neuroasthenia in the Tropics.—Reprinted from *Practitioner* 1935, Aug Vol. 135 pp. 146-154

After tracing briefly the history of the recognition of those conditions which later became known collectively as the psychoneuroses, the author gives reasons for suggesting that they would be better included under the designation Benign psychoses and that the word neuroasthenia should disappear.

Having thus defined the subject of his article Millais Culpin then proceeds to show that there is no specific condition attributable to the tropics —no such thing as tropical neurasthenia. He believes that the symptoms of the condition arising in the tropics differ in no way from those presented in the benign psychoses in Great Britain and other temperate countries and that both are due to the same psychogenic factors though some of the conditions associated with life in the tropics—climate conditions of service worry and the like can pull the trigger and precipitate the nervous breakdown.

That a large number of persons are invalidated from the tropics with neurasthenia is well known. The point is made that among these are many who were the subjects of some neurotic or temperamental infirmity before going abroad and a certain number who had actually availed themselves of the opportunity of going abroad as a flight from the strain of social life at home.

The problem of reducing the incidence of tropical neurasthenia is not very different from similar problems at home. A study of individual cases would yield systematic information upon these cases and further inform us what are the actual conditions that in specific cases have precipitated the breakdown and what kind of man tends towards breakdown.

Only thus armed with a knowledge of all the factors involved and with the power to assess the qualities which may be expected to play a part in the production of breakdown is the medical man able to advise properly upon candidates for tropical service. The same knowledge is essential in the medical officer abroad where recognition of the nature of these disorders and an informed investigation into individual cases would go far to reduce absenteeism from this cause.

H S Stansus

CASTROUOVO (Giovanni) Irritabilità, psicosi e neuropatie tropicali.
[Tropical Psychoses.]—*Riforma Med* 1935 Aug 3 Vol. 51
No. 31 pp 1180-1182.

This article is one of great interest dealing briefly with various psychoses which are observable in warm climates. The information given is very condensed but is one of the best summaries within the reviewer's knowledge. The author treats first with mere states of irritability and the milder psychoses often denominated tropical neurasthenia, such as hypochondriacal nostalgia abulia Sudanitis, Biskritis Punjab head, states of anxiety and so forth (see this *Bulletin* 1933 Vol. 30 p 802). He then mentions those forms which occur with definite disease e.g. the psychoses of pellagra and passes on to speak in more detail of the graver forms such as *amok* with its hallucinations and tendency to homicides *mas-mas* with its melancholic depression palpitation, paraesthesiae in the form of pruritus formication and phobias as met with in Tripolitania *latah* an imitative psychosis commonest in Malaya and in Northern Africa *koro* in the Celebes, an anxiety state with a castration phobia which is intense (see the following abstract) *kubisagars* the transient paralysis with vertigo in Japan it affects commonly the neck muscles and the name means man with a falling neck. Other psychoses mentioned are transient apoplectic or syncopal attacks in the young epileptiform convulsions and certain neuropathies described by

ALEXANDER & Wu (*Chinese Medical Journal* 1934) as associated with dysentery. The article should be consulted in the original by those interested in these nerve-states.

H H S

PALTHE (P M van Wolfften) Koro Een eigenaardige angstneurose. [*Koro, a Peculiar Anxiety Neurosis.*]—*Gescrekt Tijdschrift n. Nederl. Indie* 1934, Dec. 25 Vol. 74 No. 28, pp. 1713-1720 With 4 figs. (2 on 1 plate)

SLOT (J A.) Koro in Zuid-Celebes. [*Koro in South Celebes.*]—*Ibd.* 1935, May 14 Vol. 75 No. 10, pp. 811-820. With 2 figs. English summary

PALTHE (P M. van Wolfften) Aanvulling op het artikel "Koro, een eigenaardig angstneurose" [Supplementary Note.]—*Ibd.* pp. 836-837

MULDER (J G A.) Over Koro [*Koro.*]—*Ibd.* pp. 837-838.

The publication of the first of these articles brought out, in a subsequent number of the same journal, other accounts of the neurosis which is here described as Koro. This name which signifies shrivelling, is, of course, native and is used by Macassars or Buginese (South Celebes). It is a well-known affection also among Chinese under the name Shook Jong and was first described by Blonk in 1895. The article in Menzies's Tropical Handbook (1905) by Brero refers to it, and yet many practitioners in the tropics have never seen or heard of it. Blok described it as an illness in which, at irregular intervals, the feeling arose that the penis was retracting into the abdomen. If then timely help was not forthcoming death followed. The condition is greatly feared. The sufferer in his anxiety takes the penis forcibly in the hand or if not himself able to do so is assisted by others. It may be days before the attack subsides and a Koro sufferer during the attack will not want to be left alone. Should it so happen that the attack comes on and help is not at hand the patient may tie the penis with string to the leg or he may have in readiness a double-bladed clasping instrument, called Li Teng Hok, which is ordinarily used by jewellers for weighing operations. After the attack is over the patient feels greatly exhausted.

In terms of native thought this tendency of the penis to retract indicates that the "Yin" principle, representing the female power dominates the "Yang" principle which is the representative of all that is male. "Yang" and "Yin" stand for heaven and earth, sun and moon day and night, heat and cold, life and death, positive and negative, strong and weak. In order that Yin disease shall be cured Yang medicine must be given. Little real explanation of the disease can be given by natives. It is found in a definite region, occurs in a definite people. Is a generally recognised belief in a sickness which everyone fears, but the feared consequences of which no one has seen. The disease is there because it must be. Thus runs the argument for a primitive folk belief.

The sufferers are apparently neurotics, who get attacks of anxiety and constraint sensation. The anxiety arises out of sexual conflicts. In this we may see the conception of a "castration complex" according to FREUD. As already said the disease occurs among the Chinese and yet in China even at the present day castration is not a relic of antiquity. It is a reality as a mode of punishment and for the production of eunuchs. It may involve loss of the penis as

well as the testes. The reality too of the belief that destruction of the genitalia signifies destruction of life is evident among the inhabitants of the Celebes region by the use of the method in attempts at suicide not only as a regression phenomenon in schizophrenics but as a deliberate cold blooded action.

The investigation then of the disease *koro* is evidently one of psychological and ethnological importance. As factors which may excite the fear of an attack may be mentioned conditions of oedema of the lower abdomen hernia, hydrocele or elephantiasis of the scrotum. In these the gradual disappearance of the penis may be regarded as essential shrivelling.

The disease as is evident from the accounts given is not confined to men. It is known to occur also in women with identical symptoms. In women the bodily symptoms are of diminution of the genital labia and shrinkage of the breasts.

A complete insight into the cause of this sickness cannot it is thought, be obtained except by a psychoanalysis an analysis by one of allied cognate psyche that is to say of a *Niacassar* by a *Nacassar*. For the present the general term of an anxiety neurosis seems to be the most useful appellation.

As regards treatment the sufferer and his friends will probably apply the recognized treatment by fixation of the penis until the attack be over but one at least of the authors was able to effect a cure by the administration of allonal for the night a strong bromide draught next day and persuasion that the consequences feared were impossible.

W F Harry

NAPIER (L. Everard) & GUPTA (C. R. Das) Haematological Studies in Indians. Part I. Haemoglobin Estimation Methods Part II Normal Standards for a Bengal Town Population. Part III. Normal Standards for a Tea-Garden Coolie Population.—*Indian Jl Med Res* 1935 Apr Vol 22 No 4 pp 809-825 With 1 graph & 1 chart July Vol 23 No 1 pp 305-309 311-316.

This article is on a subject of the utmost importance in clinical medicine and in work of a research nature on the blood. The authors deplore the present unsatisfactory method of recording the haemoglobin content as a percentage of a shifting standard and state that the obviously scientific way is to record the content in grams per 100 cc. of blood. The present confusion is made greater by the fact that the normal [*i.e.* the average content of a large number of apparently healthy adult males] on which the percentage is based is different in different races and countries *e.g.* the British differs from the American normal.

In the present article the authors discuss and point out the advantages disadvantages and fallacies of the various methods usually employed for estimating the haemoglobin content of blood. They are all colorimetric such as (1) comparison of undiluted blood with a graduated colour standard, as Tallqvist or Dare's methods (2) comparison of blood diluted to a fixed percentage with a coloured glass-wedge standard in the Fleischl Miescher sodium carbonate is the diluent in the Helligo-Neoplan decinormal HCl (3) diluted blood compared with a fixed colour standard as picrocarmine (Gowers) Haldane's CO method Sahli's acid haematin and so on.

ALEXANDER & WU (*Chinese Medical Journal* 1934) as associated with dysentery. The article should be consulted in the original by those interested in these nerve-states.

H H S

PALTIER (P. M. van Wulfften) Koro Een eigenaardige angstneurose. [Koro, a Peculiar Anxiety Neurosis.]—*Gescrekt Tijdschr. Nederl. Indië* 1934 Dec. 25 Vol. 74 No. 28 pp. 1713-1720 With 4 figs. (2 on 1 plate)

SLOT (J. A.) Koro in Zuid-Celebes. [Koro in South Celebes.]—*Ibid.* 1935 May 14 Vol. 75 No. 10 pp. 811-820 With 2 figs. English summary

PALTIER (P. M. van Wulfften) Aanvulling op het artikel Koro een eigenaardig angstneurose [Supplementary Note.]—*Ibid.* pp. 836-837

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In Part III similar estimations were carried out to determine normal standards for tea-garden coolies nearly all of whom had lived for 10 years or longer on the garden. The study concerns 41 who must be regarded as a sample of the clinically non-anaemic population not as a sample of the whole coolie population. The Hb was only about 80 per cent of that of members of the same race living under town conditions the reticulocyte and eosinophile counts were markedly higher. It is probable from the latter findings that the coolies examined were not strictly normal and the lower Hb percentage may be ascribable to some undiscovered pathological process. Six doctors and clerks working in this district were examined and their results closely resembled those of the town-dwellers given above.

HHS

DHAR (Jyoti) Haematological Studies in Indian Women (Part Three)

A Preliminary Report on the Determination of the Differential Leucocyte Count in Eighty-Six Normal Bengali Women.—*Calcutta Med Jl* 1935 Aug Vol. 30 No 2 pp 65-90 With 2 figs. [42 refs.]

For the purposes of this investigation the author studied 86 young and apparently healthy Bengali women. Sixty five were students of Ashutosh College 12 of Bethune College Calcutta 5 selected healthy probationer hospital nurses and 4 healthy relatives of in patients. The leucocyte counts only are dealt with. The following tables compiled from the information given in the paper will save long description.

Cell	Absolute counts per cmm.			Relative percentages		
	Min.	Max.	Average	Min.	Max.	Average
Neutrophile	1 625	9 094	3 679	46	79	64.8
Lymphocyte	625	4 050	1 674	17	42	30.2
Large mononuclear	31	300	80	1	6	1.5
Eosinophile	31	658	170	1	12	3.2
Basophile	31	137	6	1	2	0.1

HHS

POINDEXTER (Hildrus A.) The Differential Blood Picture of a Group of Rural Inhabitants of Alabama.—*Amer Jl Med Sci* 1935 Sept. Vol. 190 No 3 pp 416-423 [27 refs.]

Considerable interest has been aroused of late concerning haematology and standards for different types of persons notably in India by NAPIER and Das GUPTA (see above p 75). The present article is a study carried out during a house-to-house investigation of the prevalence of syphilis a determination of positive reactors to tuberculin of those with malaria or intestinal parasites among coloured persons in Alabama.

The persons were arranged into five groups I Normal, with no indications of disease II Those with intestinal parasites chiefly hookworm or ascans III Those with malaria parasites IV Those reacting positively to tuberculin V A miscellaneous group giving a history or presenting symptoms of a condition usually associated with eosinophilia—asthma hay fever skin lesions food sensitivity and such like.

In Group I were 401 between 5 and 34 years and 158 between 15 and 30 years. The neutrophiles ranged from 51.0 per cent. in children between 5 and 9 years to 64.0 at age 25-29 years eosinophiles 12.7 at age 5-9 years, 5.9 at 30-34 years, lymphocytes between 22.8 and 29.3, monocytes 6.0 to 10.3 and basophiles 0 to 1.7 per cent. The percentages differed among those from 15-30 years as compared with figures previously recorded by R. J. NEEDLES from examining 100 nurses. The author's figures were as follows, those of NEEDLES being placed in brackets: neutrophiles 57.3 (70.0) lymphocytes 24.3 (24.6) monocytes 8.3 (3.2) eosinophiles 8.6 (1.7) basophiles 0.7 (0.5).

The Ameth count also differs that of the normal negroes was 11.0 17.6 18.9 7.6 1.9 while among the normal nurses (NEEDLES' figures) it was 8.4 22.9 23.7 8.7 and 3.2 respectively [so stated, but these are clearly not worked out as percentages and the totals differ and are therefore not strictly comparable].

In Group II there were 47 persons neutrophiles varied between 48.1 and 62.6 eosinophiles between 12.5 and 21.7 monocytes 3.1 and 9.0 other differences were small. In the malaria group of 71 (Group III) neutrophiles varied from 53.9 to 62.1 eosinophiles 4.9 to 6.4 monocytes 6.8 to 10.6. Among 60 in Group IV the only marked variation was in eosinophiles 3.8 to 8.5 per cent. In the last group (Group V) there were 153 little would be gained by giving the limits here because the conditions causing eosinophilia are many and varied and they are not subdivided aetiologicaly in this article.

In his conclusions the author states that the differential leucocyte picture did "not correlate with that usually recorded in manials as guides and averages from more northern climates and of persons of different occupations. The most consistent differences were a lower neutrophile percentage and a higher eosinophile and monocyte percentage. The average number of granules in the eosinophiles was higher in those with the larger percentage of eosinophiles. The question of whether these differences are racial, meteorologic, occupational, nutritional or a combination of these or other factors, is not answered." "It seems a pity that opportunity was not taken to estimate the haemoglobin of these natives as was done in India.]

H H S

BUCHANAN (George) Anaemia Haematological Aspect.—South African Med Jl 1935. Sept. 14. Vol 9 No 17 pp. 597-603 [10 refs.]

This paper has much of interest, but what will be of special interest to readers of this *Bulletin* are the introductory paragraphs giving the normal standards of the elements of the blood picture as found in the high veldt at Johannesburg 5 750 feet above sea-level. The blood pictures of pernicious anaemia, sprue (one case only) Diphyllobothrium anaemia, gastric carcinoma haemolytic and post-haemorrhagic anaemias have been recorded often and are text-book knowledge and these will not be further spoken of here. The normal standards, however, are of the greatest value for comparison with those recorded in India, by NAPIER and Das GUPTA, DHAK and others, and America by PONDexter (see above).

Examination of the blood of 35 healthy adult males, between 20 and 40 years of age revealed an average erythrocyte count of 6 120 000 per cmm. of 18 females 5 440 000 per cmm. In only a few healthy

subjects has the author estimated the haemoglobin he found an average of 15 gm per 100 cc. [More work is needed here as in almost every part of the world before the local standard can be established. This is a study which could be carried out in the many Colonial laboratories with very little difficulty but one which would be of the greatest value.]

H H S

JETTMAR (H. M.) Käschenschaben als Krankheitserreger [Cockroaches as Vectors of Disease].—*Heil. Akad. Woch.* 1935 Vol 48. No 20 pp 700-704 With 3 figs. [Summarized in *Rev Applied Entom Ser B* 1935 Sept. Vol 23 Pt 9 pp 212-213] [Summary appears also in *Bulletin of Hygiene*]

Few papers have been published on the part played by cockroaches in disseminating disease. After referring to Toda's investigation on *Blattella (Phyllobromia) germanica* L. as a possible vector of cholera vibrios the author records his own observations. In Manchuria and Transbaikalia *B. germanica* was exceedingly common and overran the bodies of men who had died of plague feeding on the infected secretions. In experiments, examples of this cockroach lived and reproduced for over a month, during which they were fed exclusively on plague-infected material. Their excreta contained the bacilli in a weakened form usually incapable of infecting guinea-pigs by inoculation. After prolonged feeding on infected material, the cockroaches developed in the intestine an active bacteriophage against the bacilli of plague and Asiatic cholera. In view of the occurrence of *B. germanica* and *Blatta (Periplaneta) orientalis* L. in a hospital, a number of experiments here described briefly were made to test the flora of their intestinal contents. It was found that infected cockroaches were able to carry viable pathogenic streptococci and that for weeks after the infective feed the excreta contained these organisms in a viable and highly virulent condition. Cockroaches should therefore be kept away from all places where perfect asepsis is necessary. Soiled bandages etc. should be at once immersed in disinfectant and not stored in pails until burned. As cockroaches are never found in cold storage chambers bodies and organs can be safely kept there.

LWOFF (Marguerite) Le pouvoir de synthèse des trypanosomides des culicides. [The Synthetic Action of Culicine Flagellates].—*C R Soc Biol* 1935 Vol. 119 No 24 pp 969-971

Amongst the flagellates isolated in culture from insects by NOGUCHI and TILDEN (1926) was one form called by them *Leptomonas culicidarum*. It was isolated from both *Anopheles quadrimaculatus* and *Culex pipiens*. The flagellate was subsequently transferred to the genus *Strigomonas* (Lwoff) by THOMSON and ROBERTSON. The author of the present paper now points out that the culicine form has the power of synthesizing protohaemine while the anopheline form has not this power. This property of the culicine form is shared by the plant flagellate *S. oncopelti* and all free-living protozoa so far investigated. It seems to indicate that the culicine flagellate is a more primitive one than the anopheline form.

C M Wenyon

KRISHNAN (K V) CHOPRA (R. N) & MUKHERJEE (S N) Contributions to Protozoal Immunity Part III. The Role of Electrical Charge in the Phagocytosis of Red Cells.—*Indian Jl Med Res* 1935 July Vol. 23 No 1 pp 253-262. [11 refs.]

From a study of the migration rate of the red blood corpuscles in an electric field it has been found that in monkey malaria (*P. knowlesi*) the

uninfected cells in general move faster and hence have a greater electric charge than the infected cells the charge of which however decreases with the growth of the parasite. The reticulocytes behave as normal cells some of which however in infected blood have an increased density of charge which is due to some undetermined factor. It would seem that in phagocytosis the medium itself plays an important part.

C M W

KOFOD (C. A.) MCNEIL (E.) & BOWESTELL (A. E.) A Comparison of the Distribution of the Intestinal Protozoa of the Norway Rat, Wood Rat, and Guinea Pig with Reference to the Hydrogen Ion Concentration as determined by the Glass Electrode.—*U.S.A. California Public Zool.* 1935 Vol. 41 No. 1 pp. 1-8.

As the title indicates the distribution of certain protozoa in the intestine of the animals mentioned was studied, while at the same time the pH of the intestinal contents was taken at different levels so as to throw light on the range of pH tolerated by the protozoa.

C M W

BRUMPT (E.) & LAVIER (G.) Sur une Nucleophaga parasite d'*Endolimax nana*. [Nucleophaga, a Parasite of *Endolimax nana*.]—*Ann. Parasit. Humaine et Comparée* 1935 Sept. 1 Vol. 13 No. 5 pp. 439-444 With 1 plate.

Parasites in the cytoplasm of various intestinal protozoa, having the appearance of large cocci within a vacuole are fairly well known under the name of *Sphaerite*. It is less well known that a similar organism may parasitize the nuclei of intestinal amoebae and give rise to marked hypertrophy of the nucleus which has the appearance of being filled with cocci. The organism, which belongs to the genus *Nucleophaga* was first seen in *Endolimax nana* and *Iodamoeba bifida* in 1921. In the following year EPSTEIN saw it in the nucleus of *E. nana* and named it *Nucleophaga hypertrophica* while later still BORG (1926) gave the name *A. intestinalis* to the form seen by him in *I. bifida*. In the present paper the author who has seen the parasite in large numbers in a heavy infection of *E. nana* redescribes and figures it. He comes to the conclusion that in the parasitic amoebae one species alone occurs which should bear the name *Nucleophaga hypertrophica* Epstein, 1922. The same individual harboured also *Entamoeba dispar* (*E. histolytica*) which was parasitized by *Sphaerite* but not by *Nucleophaga*.

C M W

GIEMSA (G.) Die Romanowsky Färbung protozöischer Blutparasiten in alten Trockenaustrichen. [Staining of Parasites in Dry Blood Films.]—*Zent. f. Bak. I. Abt. Orig.* 1935 Sept. 5 Vol. 134 No. 7/8 pp. 483-486.

The author discusses the possibility of obtaining a satisfactory method of staining old blood films with Giemsa stain. He concludes that this can only be done if the films without fixation have been stored in a perfectly dry atmosphere over calcium chloride. Films so stored have been stained well after 28 years, by using the customary solution, viz. 10 drops of stain to 10 cc. of water (buffered and at a pH of 7.2 to 7.5 according to the age of the film)

C M W

VENKON (T. Bhaskar) & KRISHNARAVI (T. K.) The Nature of the Donovan Body of *Granuloma inguinale*—*Trans Roy Soc Trop Med & Hyg* 1935 June 29 Vol. 29 No 1 pp 65-72 With 1 plate [14 refs.]

The Donovan bodies met with in granuloma inguinale appear to be small intracellular Gram negative bacilli which during division give the appearance of bipolar staining and diplococci. C M W

MALAMOS (B) Grahamellen beim Affen (*Grahamella* in the Monkey)—*Zent f Bakteriol* I Abt. Orig 1935 June 14 Vol. 134 No 3/4 pp 152-153. With 1 fig

In the blood of a West African monkey *Cercopithecus mona* which had been experimentally infected with *Plasmodium knowlesi* rendered immune to this infection and subjected to splenectomy a scanty infection of the red blood corpuscles with a *Grahamella* was discovered. Whether this represents a new species (*G. cercopitheci* n sp) as distinct from *G. rhesi* described by A Léger in 1922 future work alone will show. It seems possible that in this case the monkey contracted an accidental infection from one of the smaller rodents. C M W

SAMUEL (J) Rengas Poisoning—*Malayan Med Jl* 1935 Mar Vol 10 No 1 pp 14-15 With 4 figs.

Rengas poisoning is due to the sap of *Gluta rhengas* L (NO Ana cardiacae) or an allied tree is found among estate labourers gardeners and woodcutters in Malaya and is attended by acute dermatitis and constitutional symptoms. A case is described and figured

A G B

RAYMOND (W D) A Note on Cases of Poisoning by *Jatropha multifida* L.—*East African Med Jl* 1935 May Vol. 12 No 2 pp. 57-58.

The author remarks that at least three cases of poisoning by the coral plant, *Jatropha multifida* have been reported in Tanganyika the symptoms being colic cramps thirst and a subnormal temperature in one a fatal case, vomiting of a black colour occurred. The author mentions two other species *J curcas* and *J glandulifera* [*J curcas* is common in the West Indies and is known as Physic nut *J multifida* as French physic nut. The former grows rapidly and is used by the natives in Jamaica (and perhaps elsewhere) for fencing small compound. The nuts are palatable and taste like sweet almond. It is a handsome plant a good coloured illustration of *J multifida* is given in BYAM and ARCHIBALD's Practice of Medicine in the Tropics Vol. I Another species *J goniophylla* is known locally in the West Indies as Wild Cassava or Belly ache bush. The seeds when eaten act as a gastro-intestinal irritant something like croton. A fifth species *J urens* also occurs in the West Indies its leaves have stinging hairs which cause smarting itching and general symptoms of flushing of the face, swelling of the lips faintness recovery is usually fairly rapid after ejection of the poison by vomiting] H H S

REVIEWS AND NOTICES

SOUTH AFRICAN INSTITUTE FOR MEDICAL RESEARCH. Annual Report for the Year ended 31st December 1934 [Lister (Spencer), Director]—82 pp. With 2 plates. Johannesburg P.O. Box 1038.

There is little to say concerning the routine work of the Institute except that an enormous amount of very necessary investigation is done and at the Port Elizabeth Branch laboratory a large increase in the number of specimens was dealt with, 27 per cent. more than in the preceding year. These were all of a routine character 93 per cent. bacteriological and pathological 3 per cent. biochemical and 2 per cent. parasitological. Of these there is no need to speak in detail.

In the domain of Research each Department has contributed its quota. In that of Bacteriology mention may be made of pneumococci and the periodic adjustments which are necessary in the constitution of the prophylactic vaccine, and of the enquiry into the virulence of strains of *P. pestis*. Much work was done in the usual summer out-break of plague. The Department of Industrial Hygiene carried out investigations on Silicosis and this was aided by the Pathological Department's research on the extraction of mineral residues from normal and from silicotic lungs and an experimental silicosis by intra-venous inoculation of rabbits with suspensions of the mineral residues extracted from the lung of a patient with rapidly developed gross silicosis. In the Biochemical Department vitamin research was carried out, a study of the present diets in the mines, analyses of food-stuffs, consideration of alternative rations, study of nutritional deficiencies and so on. The Pathological Department in addition to the work referred to above, carried out research on cancer and, in conjunction with the serum department under Dr E. GRASSET on the influence of snake venoms and anavenoms on animal tumours. The Malaria Research Station was moved from the Northern Transvaal to Natal and ultimately was established at Eshowe, Zululand.

Twenty three papers, relating to the work done, have been published during the year by members of the staff. H H S

DE RIVAS (Díazmao) [B.Sc.Biol. M.S. M.D. Ph.D.] in collaboration with Carlos T de Rivas, B.A. M.D. Clinical Parasitology and Tropical Medicine.—387 pp. With 144 figs & 1 coloured plate. 1935. London Henry Klinpton, 283 High Holborn, W.C. [22s. 6d.]

In this book of 350 pages, an account is given of most of the animal parasites of man and of the more important tropical diseases. The type is large, the space is limited, and much of it is occupied by illustrations, with the unavoidable result that many subjects have had to be dealt with in a very summary manner. The morbid conditions caused by animal parasites, and the parasites themselves, are adequately described but bacterial diseases, and those of uncertain causation, are rather crowded out. The authors evidently write from a large and practical experience medical men who already have some knowledge of tropical medicine will find the book interesting and stimulating but beginners will not find it very easy reading.

The early chapters give a general account of the nature of parasitism, the relations of parasites to their host the metabolic disturbances

caused to the latter and the effects of secondary bacterial infections some space too is given to the mental disorders caused by the presence of parasites in the body.

From their own experiments the authors have found that parasites both Protozoa and Metazoa are extremely susceptible to relatively small variations of temperature. *Entamoeba histolytica* is killed in 5-10 minutes by exposure to the temperature of 45°C. When kept in sealed capillary tubes at 5°-10°C the amoebae remained alive for over 48 hours it appears therefore that if material suspected to contain *Entamoeba* cannot be examined immediately it is better to keep it on ice than at body temperature. Round worms and tapeworms of man and the dog were also killed in 5-10 minutes by exposure to 45°C. These facts suggested a method for the expulsion of parasites inhabiting the intestine. In dogs the application of heat (45°-47°C) for 10-15 minutes by lavage with physiological salt solution of the colon through a rectal tube, and of the upper intestine by means of a duodenal tube introduced through the mouth caused no appreciable symptoms or pathological changes in the intestinal mucosa or other tissues of the animals. The authors consider that the anthelmintics in common use effect the expulsion of parasites chiefly through a toxic reaction on the part of the host and by variations in the host's temperature. As is well known it is a common occurrence for parasites to be passed during the course of acute infections especially when accompanied by high fever. Experiments were made with many reputed anthelmintics by direct exposure of the worms to solutions of the drugs the results were unsatisfactory as no specific action on the parasites could be observed. The most effective direct parasicide was found to be a hot mixture of equal parts by volume of a 30 per cent. solution of magnesium sulphate and glycerine. With this mixture *Amoeba Para mecum* and *Giardia* were killed in half to two minutes *Ancylostoma Oxyuris* and *Trichinella* in 5-10 minutes and *Diphylidium* in 3-5 minutes. The authors consider that the intra intestinal thermal method which they use for the treatment of infection with intestinal parasites is so superior to other forms of treatment that they have completely abandoned the use of ordinary anthelmintics. In over 1,000 cases treated by this method, no serious complications have occurred other than perspiration, nausea, colic and at times general weakness and headache all of which conditions have yielded to simple treatment. In the case of tapeworms the whole worm with the scolex intact is discharged. The technique of lavage through duodenal or rectal tubes is described at length it may have to be repeated several even many times thus in a case of *Trichomonas* infection in an adult, 42 lavages were required for the complete eradication of the parasite.

The chapter on malaria gives a good account of the disease but it is not long enough to deal sufficiently with some aspects of it. Emphasis is laid on the need for caution in the treatment of paresis by malarial infection for which the authors consider that only a very limited number of paretics would be suitable they think that such therapeutic measures remain in the domain of theoretical speculation the final result of which awaits further confirmation.

There are a good many misprints in this book, and some instances of the incorrect use of zoological terms. Many of the illustrations are good, but most of those representing sections of diseased organs are not well reproduced. The book can be recommended as an instructive work by writers who think for themselves, and who have brought acute

and original minds to the subjects they discuss. They are no blind followers of authority, and very rightly prefer to base their opinions on their own experience and observation. They criticize frankly many of the commonly held optimistic views of the ease and success of the usual methods of treatment, and they show that although much has already been accomplished, there still remains much to be done for the elucidation of the aetiology, and modes of transmission of parasitic and other tropical diseases.

H. J. Wallon.

FRÓES (Hector P.) *Lidões da clínica tropical. Vol. II. Livro II (2a Serie) Doenças ou afecções causadas por animais não-parasitos prejudiciais ao homem. [Lectures in Tropical Medicine.]*—pp. xi + 238. With 83 figs. 1935. Bahia.

The first part of Vol. II of the system was reviewed a few months ago (see this *Bulletin* Vol. 32, p. 603) and mention was then made of the fact that two years had elapsed since the first volume had appeared and a hope expressed that there might be a speeding up with future volumes. This is being done and the present volume follows the last at an interval of 3 months only. It covers a wide field and contains 10 lectures, most of which would probably have to be subdivided for class purposes. It deals generally with diseases or affections caused by non-parasitic animals harmful to men. The first two chapters are concerned with arthropods: one with diptera phlebotomus, simulum, bee, wasps, Coleoptera and vesiculating species of Paederus, with caterpillars (larvata de fogo) and certain grasshoppers and crickets (as Jaquit-nabóba). The second chapter treats of spiders, scorpions, centipedes, mites and ticks and the third gives a short account of coelenterates, echinoderma, mollusca and crustacea. Next come 4 chapters on fish, including those inflicting direct injury from diodon to sharks, those with poisonous spines, those poisonous as food, and harmful ones such as the electric eel. Two chapters are given up to description of poisonous snakes, the symptoms they produce and the treatment of snake bite and a terminal chapter deals with "other non-parasitic animals injurious to man" and includes poisonous lizards, eagles, condors, satanas tigers, a heterogeneous group. Since all this is comprised within 240 pages and there are 83 illustrations, several of them full-page, the information imparted is not detailed, but doubtless in practice the delivery of the lectures is supplemented. The work is well documented.

H. H. S.

BUREAU OF HYGIENE AND TROPICAL DISEASES
 TROPICAL DISEASES
 BULLETIN.

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HELMINTHIASIS.

McCoy (O. R.) The Physiology of the Helminth Parasites.—*Physiol Rev* 1935 Apr Vol. 15 No. 2 pp 221-240 [70 refs.]

A very valuable summary of work and opinion on this subject. It is probable that no abstract could deal properly with it. This does not.

Respiration and metabolism—Taking samples of the 3 main groups of parasitic helminths *Fasciola hepatica* for Trematoda *Moniezia expansa* for Cestoda and *Ascaris suum* for Nematoda, the general facts are the same. In anaerobic conditions glycogen becomes less in the worm, and carbon dioxide and fatty acids become present in the outside medium. In aerobic conditions the absorption of oxygen is in direct proportion to the oxygen tension of the medium and the amount of carbon dioxide given off is not in proportion to this absorption. The conclusion is that the metabolism is non-aerobic and consists of fermentation of glycogen into carbon dioxide and fatty acids. The objection that this change is really due to bacteria is answered by the fact that succinic acid is present equally round *Moniezia* and in hydatid fluid and that while the acids present round the same parasite are always the same, those present round different parasites are different.

Nutrition—The food in general is of easily absorbed substances in the intestine or tissues of the host. Some worms seem to produce outside themselves digestion of the host's tissues which they then take into themselves.

Growth—This is dependent on factors in the host of which there is little knowledge except that there is variation within the species and in addition within the individual. Its amount is reasonably well marked out by a logistic curve which is the same for different stages of the same worm when the conditions are normal for that stage—for example for the larval stage of the dog hookworm outside the body at 24.5°C. and for the parasitic stage at 37.5°C.

Reproduction—The great capacity for this is a measure of the great risks which overtake an individual in its passage from egg to worm. It is greatest in those hosts which are not immune but there is no knowledge of the method of working of this mechanism.

Secretions—Anti-enzymes are present and seem to have an important part in keeping worms from being digested so long as they are living. Anticoagulins are a property chiefly of bloodsuckers haemolysins of (seen)

the tissues of parasites and not of secretions histiolysis of extra-parasitic digestion or of stages which are in fact those in which entry is gained into a host. Of exotoxin there is no evidence, of endotoxin some in infection with *W. bancrofti*.

Tropism.—McCoy quotes LANE's belief [this *Bulletin* Vol. 23, p. 228] that thigmotaxis is the only tropism of hookworm larvae [but in justice to the memory of Professor FÜLLEBROOK the reviewer has to point out his own later decision that they have a thermotaxis (this *Bulletin* 1933 Vol. 30 p. 687)].

Clayton Lane.

JOYEUX (C) & BAER (J G) *Les hôtes d'attente dans le cycle évolutif des helminthes.* [“Waiting Hosts in the Developmental Cycle of Helminths.”]—*Biol. Med.* 1934 Vol. 24 No. 8 pp. 1-25 With 8 figs. [28 refs.] [Summarized in Vol. *Bull.* 1935 Sept. Vol. 5. No 9 p. 563.]

The authors here bring together an interesting collection of facts concerning the life-histories of nematodes, cestodes, trematodes and acanthocephalids, exemplifying the use which these parasites often make of a third host occurring between the intermediate host and the definitive host. To this third host the authors give the name “waiting host.” The waiting host often serves only to collect larvae which are already sufficiently mature to take up their existence in the definitive host but in other instances the larva which is not yet sufficiently mature passes through a slight change, which renders it infective for the final host. The waiting host usually plays an important part in collecting larvae to ensure the continuation of the species by bringing about a reasonably heavy infection of the final host, but many of them re-encapsulate in creatures which are not eaten by the definitive host and so never attain maturity. In studying the life-history of parasitic worms, and encountering accidental larval forms in hosts which would not acquire them in the normal course of events it is unsafe to assume that the intermediate host has been found.

SCHWENCK (J) *Tropismus e tactismo.* [Tropisms including Thigmotropism.]—*Arch. Paulst. Med. e Cirurg.* 1935 Sept. Vol. 30 No. 3 pp. 213-227

A disquisition on tropisms in general but treating mainly of thigmotropisms and taking into account not only helminths but also insects. No original experimental work is recorded.

H H S

TAYLOR (E. L.) *Some Fallacies in the Diagnosis of Helminthic Disease.*—*Proc. Roy Soc. Med.* 1935 June. Vol. 28. No. 8 pp. 1002-1004 (Sect. Comparative Med. pp. 44-46)

The author's last paragraph is in these words—

The problem before the medical or veterinary diagnostician is to determine the presence of disease—not merely the presence of parasites. In many instances the determination of the nature of a disease caused by parasitic worms and how it may be diagnosed (the number of worms required to cause it) is still a research problem, but adherence to the medical or veterinary approach to the subject rather than to the more specifically biological one—i.e. from the angle of disease rather than from the angle of the parasite—should help to avoid such fallacies as these.

C L

ESPIÉ (A.) Parasitisme intestinal infantile en Tunisie 5e région [Intestinal Parasites in Children in Tunis]—*Arch Inst Pasteur de Tunis* 1935 Apr Vol. 24 No. 2 pp 368-370

The first systematic study it is claimed of intestinal parasitism in Tunis.

The place is Ben Gardane 100 school children had a faecal examination. Apart from *E. coli* 50 were infected namely with ascaris 35 with trichuris 17 with *H. nana* 8 with hookworms 4. If *E. coli* is included 69 were infected. Tables give the numbers who have infection with 1, 2 and 3 kinds of parasite with and without cysts. C L.

TAO (C S) YU (T H) CHU (P J) & WANG (C) Study on the Prevalence of Intestinal Parasite Infection among School Pupils in Shanghai.—*Chinese Med JI* 1935 June Vol. 49 No 6 pp 570-576 With 1 chart. [13 refs.]

An investigation of the faeces of 1412 children in the Wanchu primary school, Westgate in the City of Shanghai.

Faeces 1 gm. was thoroughly stirred with 25 per cent antiformin solution put through a filter of thin gauze centrifuged fluid decanted sediment stirred with hydrochloric acid and ether again centrifuged and decanted, one drop of the precipitate put on a slide when the writer counted and recorded the number of eggs. The number of eggs is however not mentioned the percentage of infections are these all infections 48.4 ascaris 35.9 trichuris 22.8 fasciolopsis 1.6 hookworm 0.6 clonorchis 0.3 The children appear to have been of the middle class. C L.

OHASHI (Kenji) The Results obtained in Hyogo Prefecture by the Use of Improved Privies of the Home Office Design on the Prevention of Parasite Diseases—*Jl. Public Health Assoc Japan* 1935 June Vol. 11 No 6 pp 1-4

Judging by drawings in the Japanese text the privy was that described by TAKANO [this Bulletin 1928 Vol. 25 p 938] with 2 upright and 2 hanging baffles. The results of examinations of privies and persons using them in 2 villages where they seem to have been put up in all the houses are given.

Treatments were given during the period of observation at least in Yoshuri village. In it the percentages of infected persons in 1929 and 1934 were for ascaris 27.2 and 20.5 for hookworms 23.3 and 1.7 for trichostrongylus 7.3 and 0 for metagonimus 1.5 and 0 for trichuris 68.4 and 35.7. In Yamada village the figures were for ascaris 63.4 and 52.6 for hookworms 6.6 and 0 for trichuris 63 and 50.8. As to the privies in Yamada those containing live eggs were 17.4 per cent. in 1930 and 9.1 in 1924 [? 1934] the figures for Yoshuri are not understandable. C L.

KOURI (Pedro) & DEL FRADE (Alejandro) La clonorchiasis en la ciudad de la Habana. [Clonorchiasis in Havana.]—*Rev Parasit Clin y Lab Habana* 1935 Sept.-Oct Vol. 1 No 1 pp 37-52 With 4 figs English summary

There is at present no danger of the spread of clonorchiasis in Cuba because the intermediate host is absent. The authors examined (1937)

100 Chinese, all immigrants from Canton, who complained of vague hepatic and intestinal symptoms and found 49 of them to be passing ova of *Clonorchis sinensis*. This number was found positive by direct examination of the faeces. The actual number was probably greater. In 3 out of 6 autopsies the worm was seen in the bile ducts.

H H S.

UENO (Hiroshi) Über den Zucker Fetstoffwechsel und die passive Anaphylaxie bei experimenteller Kaninchencolonorchitis sinensis. (3. Mitteilung) Der Anaphylaxieversuch bei Kaninchencolonorchitis—*Okyama-Igakko-Zasshi* (Bull. d. Med. Gesellschaft v. Okayama). 1935 May Vol. 47 No. 5 [In Japanese pp. 1161-1172. With 3 charts [34 refs.] German summary pp. 1160-1161]

KOURI (Pedro) BASSURVO (Jose G) ALVARA (Leopoldo) & LECANO (O) Técnica para el estudio de la anatomía de la Fasciola hepatica [Technique for Study of the Anatomy of *F. hepatica*.]—*Rev. Parasit. Clin. y Lab. Habana*. 1935 Nov-Dec. Vol. 1 No. 2 pp. 191-195 With 3 figs.

The anatomical structure of *F. hepatica* is easily made out with a lens or even with the unaided eye when the worm is freshly removed from the liver but preservation usually soon obscures the details. The authors have found the following procedure successful—

The worm is placed between two glass slides and gently compressed by tying the slides together with cotton. It is left for 12 hours in 10 per cent. formal. At the end of that time one slide is carefully raised (keeping it under water) and then the preparation is allowed to stay for another 12 hours, after which it is washed for several minutes in running water.

For staining Mayer's acid haemalum or Hansen's haematoxylin is recommended. The slide is placed in a vessel containing the stain, and, after 3-5 minutes is washed in running water or water made faintly alkaline with potash alum, or sodium or lithium carbonate. The haematoxylin stains more rapidly and if too deeply differentiation with 1 per cent. acid alcohol (HCl) should be carried out. Dehydration by graded alcohols and clearing by xylol or carbol-xylol and mounting in balsam follow in the usual way. The superposition of a 20 gm. weight on the glass for several days to keep the preparation flat is recommended, care being taken not to tilt the specimen whereby the canada balsam might run out and the specimen become dry.

H H S.

KOURI (Pedro) Técnica para el examen de la bilis, obtenida por intubación duodenal, en el diagnóstico de certeza y en el control terapéutico de la fasciolosis hepática. [Examination for *Fasciola hepatica* by Duodenal Sound.]—*Rev. Parasit. Clin. y Lab. Habana*. 1935 Sept.-Oct. Vol. 1 No. 1 pp. 53-67 With 9 figs.

In this article Professor Kouri describes in detail his technique for examining specimens of bile obtained by means of the duodenal sound to confirm a diagnosis of infestation by *Fasciola hepatica*. It is abundantly illustrated, even to the extent of depicting a microscope

and an observer searching for ova and an indication that the coarse adjustment is even better than the fine for this purpose. For actual details of the technique the original must be consulted. H H S

KOURI (Pedro) & VALVERDE (Armando). Nuevo caso cubano de Fasciolosis hepática humana. Curación por la emetina. Estado actual de la emetinoterapia en esta parasitosis. [Fasciola hepatica Infestation in Man cured by Emetine.]—Rev Parasit Clin y Lab Habana. 1935 Sept.-Oct. Vol. 1 No 1 pp 1-15 [19 refs.]

A Cuban, 30 years of age had a series of epileptiform attacks in the early morning. Examination of stools revealed ova of *F. hepatica* and confirmation was obtained by duodenal sound. He was treated by emetine hydrochloride intramuscularly and recovered. During two months observation and examination of faeces after cessation of treatment no ova were discovered. Altogether he was given 46 cgm. of the drug. The plan of treatment was 2 cgm. on alternate days for three doses then an interval of a month. Ova were fewer and degenerated for a time but then reappeared and four doses each of 4 cgm. were given on alternate days. Nine days after the last of these three more doses were given each of 4 cgm. A fourth series of 3 doses of 4 cgm. on three consecutive days was given 6 days after the termination of the third series. This was given owing to the impatience of the patient. The author did not think it was needed.

The method recommended by the author is to give altogether 3 mgm. of the emetine per kilo body weight, i.e. 210 mgm. for a man of 70 kilos, in doses of 6 5 5 5 cgm. on successive days with daily examination of faeces and intubation (duodenal sound) once or twice. If ova continue to be present in faeces or bile after an interval of some days 4 cgm. more should be injected and further examinations made for ova. Patients have been followed up for as long as four years and have remained cured. H H S

KOURI (Pedro) & VALVERDE (Armando). Nuevo caso cubano de fasciolosis hepática humana. Curación por la emetina.—Estado actual de la emetinoterapia en esta parasitosis. [Fasciola hepatica in Man. Treatment by Emetine.]—Medicina Paises Cálidos Madrid. 1935 Oct. Vol. 8. No 10. pp 457-468. [19 refs.] French summary (4 lines)

The authors describe another case of infestation by *F. hepatica* in Cuba.

A man of 30 years suffered from a fit of an epileptiform character. No reason was discovered for this but faecal examination revealed ova of *Trichuris*. Three years later he had a similar attack and these ova were again found. Six months later after a third fit ova of *F. hepatica* were seen in the faeces and a duodenal sound was passed and in the bile they were present in large numbers. Treatment with emetine was continued at intervals over a period of 2 months. The ova gradually disappeared, first from the stools and later from the bile, the patient gained weight, and regained energy and there has been so far [barely 3 months] no return of the fits nor of the dyspeptic symptoms of which he formerly complained. The total amount of emetine hydrochloride injected was 46 cgm. which was 6.4 mgm. per kilo body weight. H H S

GABRIELJAN (M. J.) Komplikationen bei der Emetintherapie von seiten des Nervensystems. [Nervous Complications in Treatment by Emetine.]—Arch. f. Schiffs- u. Trop. Hyg. 1935. July Vol. 39 No. 7 pp. 287-291

Eight cases were given emetine injections up to 80 in number with appearance of nervous symptoms. 5 of them had infection with *Fasciola hepatica*. The author seems to have little interest in its effect on the worms.

C. L.

JEREMY (R.) & JONES (E. B.) Report of a Patient with Hepatic Distomiasis.—Med. Jl. Australia. 1935. Sept. 14. 22nd Year. Vol. 2 No. 11 pp. 351-352. With 1 fig.

After two laparotomies for enlarged liver the eggs of *Fasciola hepatica* were found in the faeces having been looked for when they had been seen in the liver rounded areas with contents having the appearance of iodoform crystals.

Carbon tetrachloride was then given in dosage of 2-4 cc. three times with 14 days between doses, the liver became normal in size and ova were no longer seen in the faeces.

C. L.

AFRICA (Candido M.) GARCIA (Ensebio V.) & DR LEON (Valindof) Intestinal Heterophyidae with Cardiac Involvement—a Contribution to the Etiology of Heart Failures.—Reprinted from Philippine Jl. Public Health. 1935 Mar-June. Vol. 2 Nos. 1-2 22 pp. With 23 figs on 6 plates & 1 chart. [10 refs.] Abridged version in Jl. Philippine Islands Med Assoc. 1935. July Vol. 15 No. 7 pp. 358-361. With 4 figs on 1 plate.

Heterophyids have been found in 9 of 108 autopsies at Manila in the wall of the intestine and their eggs in the heart in those cases in which there was examination of this organ. Six of the 9 cases justified a certificate (from anatomical findings) of death from cardiac beriberi or acute cardiac dilatation. Most of them came from provinces where raw fish and "bagong" are articles of food. There is comparison of these findings with others from dogs.

In man the worms have been identified as *Monorchidium leucki M. tschudii*, *Diroctrium pseudocirratum* (already seen in dogs), *Heterophyes breviseta* (Africa and Garcia, 1935) and a *Plagiorchis* species apparently new. In the dog there have also been seen *Heterophyes expatrians*, *Sticciodes maxilensis*, *Apophallus eccentricus* and *Monorchidium calcarum*.

In no dog or man have the eggs been seen in the faeces, although in dog a teaspoonful of these almost microscopic flakes has been taken from the intestine as compared with a few examples only in man. But because in man so many of these infections had had heart symptoms, the hearts of 5 of the 9 (all that could then be got) were put under microscopic examination and trematode eggs brought to view in them. So that the opinion of the authors is that since eggs were not getting out of the hosts, man and dog are equally unnatural hosts for which reason it has been judged wise to give above the list of those worms which have so far been seen in dog but not in man. But in dog and man the worms are present not only in the lumen of the bowel but in its wall, as is seen when this is scraped or sectioned and the eggs

are very small 16 by 10 μ to 33 by 25 μ and capable of carriage by blood or lymph. In no case did the naked eye appearance of the intestine suggest that it had worms within it and in dogs the reactions to their presence were small only a little congestion with petechial submucous haemorrhages which are specially common with sudden death and in beriberi. In the heart subepicardial haemorrhages of different sizes were readily seen most commonly on the right side. The organ was somewhat dilated with walls thicker than normal, this being caused by oedema with which fluid all spaces between muscle fibres were overfull the blood vessels were engorged and being by reason of the oedema without proper support there was often a burst with haemorrhage and eggs visible among the red cells. The suggestion is that there is embolism of capillaries by eggs muscular spasm from local bloodlessness and rupture of muscle and capillaries. Many eggs may be got by squeezing a cut surface of the heart. The question comes up Is this embolism limited to the heart? The condition of other organs has not yet been looked into but this limiting is hardly likely At least in wet beriberi there should be thought of Heterophyids as its cause.

C L

AFRICA (Candido ML) & GARCIA (Eusebio Y.) Heterophyid Trematodes of Man and Dog in the Philippines with Descriptions of Three New Species.—*Philippines Jl Sci* 1935 June Vol. 57 No. 2 pp. 253-267 With 4 plates.

The worms described and figured are *Heterophyes expectans* n. sp in dog *Heterophyes breviseca* n. sp in man (see p 90) *Sloododora manilensis* n. sp in dog *Monorchotrema* spp from dog and man probably *M. taihoku* Nishigori, 1924 and *M. taichui* Nishigori, 1924 and *Diorchotrema* sp probably *D. pseudocirrata* (Vitenberg 1929)

C L

WATANABE (Masumi) Ueber den Körperbau des Miracidiums von *Paragonimus westermani* [The Structure of the Miracidium of *Paragonimus westermani*]—*Okayama Igakkai Zasshi (Mitt d Med Gesellsch z Okayama)* 1935 June Vol. 47 No 6 [In Japanese pp 1474-1479 With 6 figs. on 1 plate. German summary p 1473.]

The miracidium of *P. westermani* has these distinctive characters. The ciliated covering is made up of 17 cells in 4 rows the numbers in each row being 6 7 3 and 1 There is an anterior cone no eye spots, a pair of sense organs, a pair of terminal cells the excretory canal forming a rosette the presence of unicellular glands and lenticular bodies is doubtful. [The fine drawings have pointers with roman letters but they are explained by Japanese words only and so lose most of their value for those of other nations.]

C L

WU (Kuang) Notes on Certain Larval Stages of the Lungfluke, *Paragonimus* in China.—*Chinese Med Jl* 1935 Aug Vol. 49 No. 8. pp 741-748 With 4 figs. on 2 plates.

A description of the second generation redia and the cercaria of the *Paragonimus westermani*

The rightness of identification is evidenced by the fact that the cercaria from *Melanesia libertina* has penetrated the leg-joints of Potamonautes crabs, with metacercariae 23 days later encysted in the leg muscles, these having the structure of those of *Paragonimus*. The cercaria is microcercoous, unable to swim, but "moves like a measuring worm. An anterior spine lies on the antero-dorsal aspect of the oral sucker, there is a slender prepharynx, pharynx 0.015 x 0.012 mm. about midway between the two suckers, 7 penetration glands a side, 4 of them large and lateral and 3 small and medium, a tubular excretory system. Wu holds with AMEEL (Ammer JL Hyg 1934 Vol 19 p. 296) that the cercaria described by FAUST (Parasitology 1922, Vol. 14 p. 264) is not that of *Paragonimus*.

C. L.

LEO (T. L.) A Case of Paragonimiasis.—*Chinese Med. Jl.* 1935 Aug Vol. 49 No. 8 pp. 784-788. With 1 fig

This is believed to be the first case of paragonimiasis from Mukden and indeed from Manchuria. A macrophotograph shows the oral. It was cured by 37 grains of ejective apparently in 3 courses.

C. L.

CHEN (H. T.). Notes on *Paragonimus* in Rats.—Reprinted from *Lingnan Sci. Jl.* Canton 1934. Apr Vol. 13. No. 2 pp. 229-330.

The rat is a host of *Paragonimus*, presumably near Canton. Three of about 6 rats had 1 to 3 mature specimens of *Paragonimus* in their lungs, a dog had one. Local examinations of crustaceans have so far all been negative.

C. L.

WATARAE (Masumi) Über die Embryonalentwicklung von *Paragonimus testicirratus*—Otoramu-Ishikai-Zenki (Mits. d. Med. Gesellschaft Otoramu) 1935 May Vol. 47 No. 5 [in Japanese pp. 1173-1180. With 18 figs. on 3 plates. [In red German summary p. 1173.]

KHALIL Bey (M.) & AZIM (Al. Abdell). The Introduction of Schistosoma Infection through Irrigation Schemes in the Aswan Area, Egypt.—*Jl. Egyptian Med. Assoc.* 1935. June. Vol. 18. No. 6 pp. 371-377. With 1 map & 2 figs.

A first step in an investigation of the effects, in a special area, of using perennial in place of basin irrigation in Egypt.

In the stretch of Nile from Aswan to Esna there have been set up 12 electric pumps to fill the irrigation waterways at all times of the year. A pump is usually at work for 3 or 4 days every 2 weeks. It sends the water into a discharge basin and from this into the main canal of the district, and a strong valve puts a stop to passage of water back into the river when the pump is no longer at work. The suggestion now is that these valves should be out of action when the pump is not in use, so that the water in the canal will make its way back into the river and the whole bed become free of water since any hollows in it will become dry quickly in the general conditions. A survey has been made of the different helminths present in the population so that comparison may be made in the future.

C. L.

BARLOW (Claude H.) Further Studies of the Revival, after Drying, of the Small Hosts of the Human Schistosomes of Egypt.—*Amer Jl Hyg* 1935 Sept Vol 22. No 2. pp 376-391 With 2 figs.

The winter closure of irrigation waterways in Egypt has a great effect on health by causing the death of many larval hosts of schistosomes and of the schistosome larvae in such molluscs as are still living after it.

The work is an addition to that already noted in this *Bulletin* (1933 Vol. 30 p 674). After about 40 days of the slow drying which takes place in the irrigation waterways during winter 91 per cent of 562 *Planorbis boissyi* and 90 per cent. of 199 *Bulinus contortus* were still living. When after such drying snails were put aside in the laboratory they were found living up to as much as 180 days of drying and the belief is that on account of the small numbers which by that time were still there to be used for testing the time limit is probably longer. The marked effect of drying on the percentage of infected snails is seen in the table.

Comparison of infection percentages in snails revived after desiccation and those living in water
(Canal V)

Date of collection	Species	Total collected	Number examined	Per cent. infected
Sept. 1934	<i>P. boissyi</i>	69 (from water)	69 (undried)	69.5
Sept. 1934	<i>B. contortus</i>	128 (from water)	128 (undried)	22.2
Jan. 15 1935	<i>P. boissyi</i>	27 (dry)	27 (revived)	29.6
Jan. 15 1935	<i>B. contortus</i>	61 (dry)	61 (revived)	4.9
Jan. 27 1935	<i>P. boissyi</i>	210 (dry)	172	5.8
Jan. 27 1935	<i>B. contortus</i>	537 (dry)	161	0.0

Then too it is clear that this disappearance of infection is in part caused by death of the larval schistosomes in the mollusc. There are thousands of miles of canals which are the ideal habitat of both species of significant snails which show no infection at all at the end of the winter closure, and this has a tremendous bearing on the control problem. Again when put in water after drying the molluscs lay many more eggs in the same time than do those which have not been dried.

C L

SCARTOZZI (Cesare) & PARVIS (Flavio) Contributo allo studio della formula leucocitaria nella bilharziosi vescicale egiziana. [The Differential Leucocyte Count in Bilharziasis in Egypt.]—*Giorn di Bacteriol. e Immunol.* 1935 Oct. Vol. 15 No. 4 pp 571-582. [12 reis.] English summary (5 lines)

The author studying from the haematological standpoint 67 cases of Egyptian bladder bilharzia, found a general average of 13.7 per cent. eosinophile (maximum 42 per cent.) and of 10 per cent. monocyte (maximum 26 per cent.).

In some cases moreover they remark that there is a sort of antagonism between eosinophilia and monocytes.

C L.

See also p 148 SALAH Helminthic Ansemias in Egypt.

Giordano (Mario) Lo stato attuale della schistosomiasi in Libia, con speciale riguardo alla schistosomiasi vesicale nel Ferran.—*Att. Ital. Sci. Med. Colos.* 1935 July 1 Vol. 16. No. 7 pp 510-515
English summary (3 lines)

Adams (A. R. D.) Studies on Bilharzia in Mauritius. II.—The Recovery of Adult Schistosomes haematobium after Development in *Bulimus (Pyrgophryne) forskali*.—*Jour. Trop. Med. & Parasit.* 1935. July 17 Vol. 29 No. 2 pp. 253-260.

The chain of infection has been completed from miracidium to cercaria in *Bulimus forskali* and from cercaria to fully developed *S. haematobium* in the mouse in Mauritius.

For the first links in the chain see this *Bulletin* 1934 Vol. 31 p. 774 Adams at first made use of but few cercariae, not more than 500 and usually many fewer and got no infection in guineapigs and mice (*Ann. Rep. Bad. Lab. Mauritius* for 1934). He makes note too of the fact that reading of work on the subject gives the mind the strong idea that overinfection of test hosts is the great danger in these tests. But when a clean laboratory-bred mouse was put in the way of infection for 2 hours at a time by all cercariae coming freely from specimens of *B. forskali* there was full growth of worms. The complete time was 24 hours in 12 days and the number of molluscs about 24. Natural death of the mouse took place after 4 months and there were got from it these rough numbers of male and female *S. haematobium*—from the liver and portal vein 60 from the mesenteric vessels 20 from the lungs 120. Males were about 12 times as many as females. The normal salt solution in which the parts were dissected had no centrifuging mass, typical eggs, from them came miracidia which in turn made their way into *B. forskali*. All worms in the mouse were of full development and had in all chief details the structure of *S. haematobium*.

C. L.

Faust (Ernest Carroll) Some Newer Aspects of Schistosome Infection in the Western Hemisphere.—*Jl. Trop. Med. & Hyg.* 1935. Oct. 15. Vol. 38. No. 20. pp. 249-259. [76 refs.]

After a historical account of the species of molluscs in question, expression is given to the belief that bilharzia infection came to America in slaves and that the only "reservoir host" in the New World is the imported West African green monkey *Cercopithecus sabaeus*. The molluscs acting as hosts of the larvae are members of the genus *Australorbis* this genus having as type *A. olivaceus* Spix 1827 and as other species firstly *A. glaberatus* (Say 1818) with the synonym *A. quadrangularis* Sowerby 1821 secondly, and possibly *Planorbis continentalis* Lutz 1918 and *P. antiguensis* Sowerby 1877 the genus being exclusively American in distribution. A key is given to all Planorbidae. The known endemic foci are considered in detail and are—Northern Brazil, Venezuela, Dutch Guiana, St. Lucia, Martinique, Guadeloupe, Antigua, St. Kitts, Nevis, Montserrat, Vieques and Porto Rico. As to all others the statement is made that the presence of Meso-American schistosomiasis should be accepted in them only after the strongest evidence for it has been put forward. After consideration of the life-cycle and tissue changes, it is pointed out that the importance of the infection in public health can be known, and steps for its control can be undertaken, only after there is detailed

knowledge of the wideness and varying intensity of its distribution.

[The mollusc is cited in the paper as *centrimetralis*. The name was given by LUTZ in *Memorias do Instituto Oswaldo Cruz* 1918 Vol. 10 and both in the Portuguese version (p 73) and the English one (p 52) the spelling is *centimetalis* which is therefore the valid name]

C L

EL SALAM (A. Abd) A New Antigen for the Diagnosis of Bilharziasis by the Complement Fixation Test—*Jl Egyptian Med Assoc* 1935 May Vol. 18. No 5 pp 353-355

In this article the author makes a preliminary report on the antigenic properties of an extract of *Schistosoma bovis* worms which had been collected from the mesenteric veins of infected cattle subsequently washed in saline dried in an incubator at 37°C for 48 hours and then kept in a desiccator over calcium chloride

Two different extracts were tried —

(1) An alcoholic extract made with 1 gm of the worm powder extracted with 100 cc. of rectified spirit for 48 hours at room temperature and subsequently concentrated to half its bulk by means of an electric fan.

(2) A saline extract consisting of a 1 per cent. extract of powdered worms in 0.5 per cent. carbolic saline for 48 hours and subsequently cleared by centrifugation at 4,000 r.p.m. for 10 minutes

Of 10 sera derived from patients containing eggs of *S. mansoni* or *S. haematobium* in their excreta, 9 gave positive complement fixation reactions with the saline extract but all were invariably negative with the alcoholic extract. On the other hand 10 sera from cattle infected with *S. bovis* reacted negatively to both extracts.

Two strongly syphilitic sera from patients who had never suffered from bilharzia reacted negatively as did 10 sera from persons harbouring intestinal parasites but not infected with bilharzia.

Cholesterin reinforcement is stated to have enhanced the degree of fixation in bilharzia positive sera, but introduced an error inasmuch as syphilitic sera tended to react.

[The fact that the sera of patients infested with *S. mansoni* and *S. haematobium* reacted positively with an antigen prepared from an animal schistosome is in accord with the well established conception of the group nature of this reaction. That *S. bovis* antigen failed to react with the sera of animals harbouring its own parasite is surprising but still more so is the uniform failure of an alcoholic extract of a schistosome to react with bilharzia infested sera when the corresponding saline extract was effective. This finding is contrary to the experience of other workers on this subject] N Hamilton Fairley

NIEVA (Dominador E) Epileptiform Convulsions probably due to Schistosomiasis. (Report of a Case).—*Bull San Juan de Dios Hosp Manila* 1935 July Vol 9 No 7 pp 234-237

The striking finding in the stool examination was the presence of the ova of "Schistosomum Haematobium" in the stool of the patient aged 39 of whom there is no note that he had ever been out of the Philippine Islands. He had also for a year had convulsive attacks about twice a week. He was given tartar emetic intravenously

and later emetine hypodermically and had no further convulsions during 2 months. Of the giving or not of sedatives nothing is said.

C. L.

MANNZER (Fritz) Sur la bilharzose pulmonaire, maladie des poumons simulant la tuberculose. [Schistosomiasis simulating Pulmonary Tuberculosis].—*Acta Med Scandinavica*. 1935 Vol. 85. No. 6 pp. 533-582. With 10 figs. 14 refs.]

A description of 5 cases of chronic infiltrative disease of the lung with mimicry of tuberculosis, and in addition a large spleen, eosinophilia, and cure by antimony. One of them had at the same time intestinal and urinary bilharziasis. The X-ray pictures are very good.

C. L.

CLARK (Engene) & GRAEF (Irving) Chronic Pulmonary Arteritis & Schistosomiasis Mansoni associated with Right Ventricular Hypertrophy. Report of a Case.—*Am J. Pathology* 1933 July Vol. 11 No. 4 (65) pp. 663-706. With 2 plates. [17 refs]

A Porto Rican negress of 21 with Mansonian schistosomiasis died of congestive heart failure and pulmonary arteritis, the intima of the pulmonary artery being slightly thickened with atherosomatous plaques.

She left Porto Rico when 9 and had lived at New York since. At 14 palpitation and shortness of breath came on, and later ascites and oedema. The necropsy showed the signs of backworking with dilatation of the cavities of the right heart and a dilated pulmonary artery with the lesions noted. In the lungs were areas of mixed congestion, granulomata often with giant cells in them surrounding ova, and the lesions secondary to a rise in arterial pressure. No Wassermann test was made. The reference under "Bey" is to S. Am. this Bulletin 1932, Vol. 29 p. 411.

C. L.

MONTILLA (Candido) La fumadin nella cura della bilharziosi vesicale [Fumadin in the Treatment of Urinary Schistosomiasis].—*Arch. Ital. Sci. Med. Colon.* 1935. Sept. 1 Vol. 18. No. 9 pp. 662-663. With 1 fig. English summary (4 lines).

The patient, a man of 18 years, a native of Derna (Cyrenaica) suffered from painful micturition and haematuria 20 days after bathing in a stagnant pool near the Bu Manger waterfall. Ova of *Sch. haematobium* were numerous in a centrifuged specimen of his urine. He was treated with fumadin injected intramuscularly on alternate days, starting with 1.5 cc., then 3.0 and then 5.0 cc. till cured. After the fifth injection blood was still present but ova were very scarce after the seventh micturition was no longer painful, blood was not seen, nor ova in the centrifuged deposit.

H. H. S.

LEE (C. L.) & CHU (H. J.) Simple Technique for studying Schistosomes Worms In Vitro.—*Proc. Soc. Experim. Biol. & Med.* 1935 June. Vol. 52 No. 9 pp. 1397-1400. With 1 fig.

"A simple technique is described for maintaining the life of adult schistosomes *in vitro* over a period of several weeks which, with frequent changes of medium, may be extended to 2½ months. This

is made possible by the use of small tissue culture flasks which prevent bacterial contamination and desiccation of the media. The latter may be either horse sheep or rabbit sera or human ascitic fluid

The authors description and figures make the steps of the procedure and the reasons for their use very clear C L

LEE (C. U.) & CHUNG (H. L.) Action of Various Organic Antimony Compounds on *Schistosoma japonicum* In Vitro.—*Proc Soc Experim Biol & Med* 1935 June Vol. 32. No 9 pp 1400-1403

Using the technique of LEE & CHU described above and sheep serum or ascitic fluid as the medium in which the worms were kept the authors come to these conclusions —

The lethal action of sodium antimonyl tartrate fowadin urea stibamine and neostibesan on *Schistosoma japonicum* is studied *in vitro* and the results support the prevalent belief that the trivalent antimony compounds are more effective in the treatment of schistosomiasis than pentavalent salts and our own clinical experience that permanent cure of *Schistosoma japonica* results more readily with tartar emetic than with fowadin C L

KHAW (O. K.) Concentrated Fowadin in Treatment of Schistosomiasis Japonica in Rabbits.—*Proc Soc Experim Biol & Med* 1934 Dec. Vol. 32. No 3 pp 520-522.

A treatment by 6 weekly intramuscular injections of concentrated fowadin was given to rabbits as soon as eggs were seen in the faeces the infection being deliberate. These are the details.

The rabbits weighed 1.5 to 2 kgm. the drug is antimony III pyrocatechin-disulphate of sodium and calcium there being 14.3 mgm. of Sb III and 7 mgm. of calcium in every cc. The doses were 0.15 0.25 0.3 0.3 0.3 and 0.3 cc. Of 20 treated 14 were cured, 1 was uncured and 5 died. Of those who died only one had a complete treatment the livers showed more general fatty change than did the untreated controls. Of the 7 untreated controls 5 died and 20 to 50 per cent. of eggs in their tissues were dead. C L

CAWSTON (F. G.) The Control of Bilharzia Infection in the Union.—*South African Med Jl* 1935 Aug 10 Vol. 9 No 15 pp 519-520

The paper's title is the measure of its scope

For species sanitation there must be identification of species in other words co-operation of conchologist and sanitary officer and here the coming of Major CONNOLLY's final report will be of great value. Lawston is unable to distinguish between *S. haematobium* and *S. mansoni* in their adult or cercarial stages only the eggs being he holds different. The optimum habitat of *Physopeltis* is the under surface of the smooth leaf of the light blue water lily or the broad-rush but the molluscs have a loose hold on the leaf and easily fall off. In discussion on the distribution of the molluscs it is noted that *Physopeltis globosa* is in the Union a carrier of *S. bovis* as well as of *S. haematobium*. This ovine [sic] parasite is readily distinguished, for the adult worms possess only 3 glands and the ova are long and spindle shaped. Drying is believed to put to death

old mollusca more easily than young ones, but increase of transport and introduction of water plants has brought about a spread of the disease.

C. L.

CAWSTON (F. Gordon). A Consideration of the Antimony Content in Drugs used for the Destruction of Schistosomes.—*Jl. Trop. Med. & Hyg.* 1935 July 15. Vol. 38. No. 14 pp. 169-170

HUNNICUTT (Thomas N.) Jr. An Anemia associated with a Fish Tapeworm (*Diphyllobothrium latum*) Infestation.—*Jl. Amer. Med. Assoc.* 1935 June 1 Vol. 104 No. 22 pp. 1884-1886 With 1 chart.

An immigrant from Finland, in the United States since 1921 had anaemia cured by liver treatment, cure maintained by passage of tapeworms.

The blood cells were 1,370,000 and 4,600 Hb 34 (Sahli) reticulocytes 0.8 and eosinophils 1.5 per cent, marked anisocytosis, polkilocytosis, 3 normoblasts and 1 megaloblast. He was given liver extract parenterally into the glutei in maximum doses for 10 days and thereafter "capsules of liver-stomach concentrate" for 4 months. In 8 weeks he had a normal blood. Five months after he was first seen he was given male fern passed 4 worms and segments of others and was found dewormed a month later. His blood values continued to be good.

C. L.

PETRUSCHEVSKY (G. K.) & BOLDVR (E. D.). Propagation du botriocephale (*Diphyllobothrium latum*) et de ses larves plero cercoids dans la région du Nord-Ouest de l'U.R.S.S. [Spread of *Diphyllobothrium latum* and its Larvae in U.S.S.R.]—*Ann. Parasit. Humaine et Comparée* 1935 July 1 Vol. 13 No. 4 pp. 327-337 [25 refs.]

A paper of great local importance since it gives a list of all Baltic fish parasitized with plero cercoids of *D. latum* with the degree of infection organ by organ.

C. L.

WOODBURY (Lowell A.). Infectivity of the Plerocercoids of *Diphyllobothrium cordiceps* (Leidy) for Man.—*Jl. Parasitology* 1936 Aug. Vol. 21 No. 4 pp. 315-316.

Woodbury has not been able to cause infection of himself though in 2 groups of tests he swallowed plero cercoids of *D. cordiceps*.

These plero cercoids are the cause of a wormy state in the flesh of the Yellowstone Lake trout *Salmo trutta* STEINDACHER (*Jl. Parasit.* 1934, Vol. 19 p. 162) has seen no difference between the strobiles of *D. latum* and *D. cordiceps* so Woodbury makes the suggestion that here is a phylogenetic species.

C. L.

IWATA (Seishun). Some Experimental Studies on the Regeneration of the Plerocercoid of Manson's Tapeworm, *Diphyllobothrium erinaceus* (Rudolphi) with Special Reference to its Relationship with *Sparganum prolesiforme* Iijima.—Reprinted from *Japanese Jl. Zool.* 1934 Sept Vol. 6 No. 1 pp. 139-158. With 43 figs. [33 refs.]

After transplantation of injured plero cercoids of *D. erinaceus* there were seen branched forms, but though they had the same morphology

as *S. proliferum* the conclusion that the two species are the same is
not safe

C L

HUNNINEN (Arne V) Studies on the Life History and Host-Parasite Relations of *Hymenolepis fraterna* (*H. nana* var. *fraterna* Stiles) in White Mice.—*Amer Jl Hyg* 1935 Sept. Vol. 22. No 2. pp 414-443 With 2 charts & 7 figs. [11 refs.]

By a special method the cysticerci in the villi were counted while eggs were tested by smear and D C F. In these ways conclusions were come to regarding the life history. The technique is as follows

The entire small intestine was placed in tap water in the ice-box overnight. The next day the mucus could be removed by shaking the intestine in water. The intestine was then cut into convenient lengths and spread in a Petri dish with the tips of the villi up. Just enough water was added to cover the intestine. The cysticercoids could then be counted directly with the aid of the medium power of a dissecting microscope.

Infected and non infected mice lived together and watch was kept on them till they died. Since eggs are infective when passed since mice eat faecal pellets since the latent period before the new strobiles produce eggs is 14 to 20 days and since 6 of 9 negative mice began to pass eggs 14 to 29 days after being put with infective ones they must have become infected at once. In the absence of reinfection infection continued for 2 to 56 days. But when conditions were those making for natural reinfections there became evident a resistance to infection shown by egg negative periods by fewer eggs when they were present and finally after 100 days by complete absence of eggs for long periods. This was not due to any loss of coprophagetic habit for artificial infections also failed at this period. Two other curious immunity features were seen. Two to three days after giving birth to a litter she-mice lost their infections becoming negative to D C F again 3 mice which had passed no eggs for 252, 255 and 329 days began to do so and then died in 17 to 60 days. Nearly all cysticercoids are in the first half of the intestine. Of eggs given in food to mice up to at least 55,000 only 4.1 per cent. become cysticercoids and similar percentages show that nearly all cysticercoids become adults. About 85 per cent. of eggs fed to a mouse are passed *per anum* many of them viable. There is full development of cysticerci in 93 to 96 hours though suckers appear before hooks. Tests on 47 mice and 28 rats fed with known numbers of eggs show that up to 102 hours there is no drop in the numbers of cysticercoids in villi. At 115 hours these drop to one-third. At 144 hours there were few or none in villi. With a single infection there is retardation of growth of some strobiles so that when those whose development has been rapid die, the others grow thus with a short adult life for each strobile there may be a long infective period for the host. Immunity to a second infection shows itself in the number of cysticercoids which develop but whether its cause is in the earlier cysticercoids or in adults is unknown. A dose of 250 to 500 eggs was enough to give immunity against a second infection. There is age resistance under 1 and over 5 months of age [See also this *Bulletin* 1924 Vol. 21 p 551 1925 Vol. 22 p 478.]

C L.

Dew (Harold R.) Advances in Our Knowledge of Hydatid Disease during the Twentieth Century.—*Brit. Med. Jl.* 1935. Oct. 5. pp. 620-622.

There must be no complacency with failure to advance knowledge of this subject. Advance is needed in spite of the additions to our knowledge during the last 35 years.

Australian surgeons had long maintained that secondary infections could take place when a primary cyst was opened. of this Dr. Dew gave the proof and the knowledge has made surgery quite different. Dew's report of the first alveolar hydatid in Australia wrecked the main and geographical argument of those whose belief was that it and ordinary hydatid are different animals. On the pathology of special organs it is remarked that in about three-fourths of cases there is some leakage which causes the patient to see a doctor and that there is not enough knowledge of the rate of growth of cysts their primary position in the young, and the numbers and sorts of complications. X rays and immunological tests have completely altered diagnosis. Treatment is still surgical and formalinization has made it much simpler. There is still uncertainty on the best line of operation for a deep cyst of the lung, the cerebral cyst has its special difficulties, and the question of exploring the common bile duct in intrabiliary rupture will always be difficult.

C. L.

BARNETT (L.) A Department for Hydatid Disease Research and Prevention.—*New Zealand Med. Jl.* 1935 Aug Vol 31 No. 182 pp 258-260

Officials of the New Zealand Agricultural Department from records kept of slaughter house findings have reported that hydatid cysts were present in lungs or liver or both organs in 5 per cent. of lambs and calves and up to 50 (in some districts as much as 90) per cent. in aged animals. The author estimates that at the present time some ten million of the New Zealand sheep are infected.

The prevalence of hydatid disease in man, though diminishing in some parts of the country is still fairly common in others. Apart from cases among private practitioners about a hundred are treated in hospitals, more in the South Island. By way of propaganda a Hydatid Poster has been printed and widely distributed at post offices schools, county council and borough meeting rooms, sheattofts, shearing sheds etc. Now a department for research on and prevention of the disease has been inaugurated at the Medical School of Otago University to investigate the biological, pathological and clinical aspects of the subject.

H. H. S.

SCHMIDT (K.) Die Echinokokken-Krankheit in Palastina. [Hydatid Disease in Palestine.]—*Arch. f. Schiffs- u. Trop. Hyg.* 1935. Nov Vol 39 No. 11 pp. 453-464 With 1 fig

Hydatid infection is a serious problem in Palestine.

Since 1922 there have been 129 cases of hydatid cysts admitted to hospitals in Palestine. The cause is easy to see, for about 70 per cent. of the sheep and 40 per cent. of cattle in the slaughter houses are infected and the condemned material is not properly disposed of, so that jackals as well as dogs are concerned in the spread of the infection.

C. L.

Claessen (Gunnlaugur) On *Echinococcus* In the Lung—*Acta Radiologica* 1935 Sept. 15 Vol. 16 No 5 pp 601-615
With 9 figs. (8 on 2 plates)

Hydatid cysts of the lung not liver cysts which have made a passage through the diaphragm into the lungs are rare in Iceland 1.5 per cent. of 682 cases

This figure is in contrast to the 18 to 25 per cent. present in Australia in Dew's belief and Claessen holds that knowledge needs to be filled in on this point and on others. One of these is possible carriage by air a method favoured by Australian writers yet Iceland farmers feed their stabled animals indoors with dry faecia infected hay A full description with beautiful X-ray pictures is given of a pulmonary case in which after the host tripped there was a burst into a bronchus so that death from suffocation almost came about While the cavity did not empty it did not become septic and its position having been seen by X-rays it was drained through the thoracic wall. It is noted that in the lung the cyst is rarely old before it bursts and for that reason the fibrous reaction to it is rarely great and the formation of daughter cysts is equally rare Natural healing with expectoration of the contents is common. In an earlier lung case of the author's followed for 14 years no secondary cysts were ever seen. C L

DANG (Jernadar Manohar Lal) An Unusual Site for a Hydatid Cyst—*Indian Med Gaz* 1935 Oct. Vol. 70 No 10 p 566

A Sikh, aged 23 years came to hospital with a small swelling just below the angle of the left jaw. It had been increasing gradually for a year and a half. It was thought at first to be glandular but no others were affected, and the swelling was noticed to be fairly mobile and cystic although extending fairly deeply. At operation it proved to be a hydatid cyst about as large as a hen's egg beneath the deep cervical fascia and lying on the left submaxillary gland.

H H S

TURNER (Edward L.) DENNIS (E. W.) & BERBERIAN (D A) Studies on the Production of Artificial Immunity against *Echinococcus granulosus* in the Definitive Host. (The Results of Four Years Investigation of this Problem)—*Jl Egyptian Med Assoc* 1935 Aug Vol 18. No 8 pp 538-548

The authors report that some immunity has been obtained in the dog to infection with *Echinococcus granulosus* by injection of an antigen obtained from hydatid cysts.

The work comes from the American University of Beirut Syria. About a quarter of the street dogs have the strobile. Those used for testing were believed to be clean. From 3 000 to 50 000 scolices were given in food to 19 controls 18 became infected 13 heavily so Six dogs had 5 injections of 1 per cent phenolized antigen made from the cuticular and germinating membrane of sterile cysts when fed 21 to 27 days later with 1 000 to 10 000 scolices, 3 were negative 2 were heavily infected and the sixth was judged to have been infected before. Thirty two dogs were given 2 to 5 injections of a 1 per cent suspension of scolices and membrane from fertile cysts 17 became infected 15 free from infection after being fed with infected (contd)

material" at an interval of 6 to 122 days after the last injection. Twenty three dogs were given 1 to 5 doses of antigen, being a suspension of 1,000 to 20,000 scolices from fertile cysts and fed with infective material 4 to 238 days after the last injection and autopsy was made 24 to 131 days later. 10 had no infection and 6 had heavy infections. The Casoni reaction was useless in determining whether a dog had the tapeworm.

C. L.

DIXON (H. B. F.) & SMITHERS (D. W.). *Cysticercosis (Taenia solium)*.—*Jl Roy Army Med Corps*. 1935. Apr May June July & Aug Vol. 64 Nos. 4 5 & 6 pp 227-234 300-306 375-380 Vol. 65 Nos. 1 & 2 pp 28-34 91-98. With 10 figs. [68 refs.]

A valuable collection of knowledge on this subject set out clearly. It will no doubt be in constant reference in the future. The author's conclusions are these.—

(1) Cysticercosis (*Taenia solium*) is a disease far from uncommon, especially in those who have lived in countries where sanitation is defective.

(2) It is deserving of more recognition than it now obtains in medical and neurological textbooks, as its manifestations are both varied and variable.

(3) The older descriptions of the disease are misleading in that any case may present various symptoms at different stages of the disease and if the case is followed up to the end mental and/or nervous symptoms almost invariably occur.

(4) Any patient previously healthy who develops fits or anomalous nervous or mental symptoms and who has lived abroad, should be suspected of suffering from cysticercosis until proved otherwise.

(5) Unless evidence of cysticercosis is systematically sought for the diagnosis may be missed, as the subcutaneous nodules which are suggestive of the disease may be absent at the time of the examination, only to come out in crops at a later date remaining for a varying period of time and then disappearing, and radiological evidence may not be convincing for some years, as calcification does not usually take place until some four or five years after infestation.

(6) Every case suspected of cysticercosis should be re-examined at six monthly or yearly intervals for the presence of subcutaneous nodules and calcification of cysts in the soft parts.

(7) There is no known treatment for the disease. Administration of luminal and bromides keeps the fits in check in some cases.

"(8) The prognosis is bad.

(9) There is every reason to believe that prophylactic measures properly applied would considerably reduce the incidence of the disease which has decreased in most countries with the advance of modern sanitation and hygiene."

C. L.

GRADO (Giuseppe). *Cisticercosi muscolare disseminata. [Disseminated Muscular Cysticercosis.]*—*Riv Sanitaria Siciliana*. 1935. May 15. Vol. 23. No. 10. pp 742-744 747-752, 755-757. With 6 figs. French summary (8 lines).

Two cases of cysticercosis are described, both women, one aged 43, the other 34 years. The former had been treated 4 years previously for taeniasis and the worm was expelled and she had seen no fragments since. During the past year however she suffered from pains in the legs, cramps and formication. X-rays revealed numerous small opacities of calcified cysticerci in the muscles of the back, arms and

legs while in the second patient though in fair numbers these were much fewer than in the first. Neither presented any sign of epilepsy or cerebral involvement such as has been described by MACARTHUR.

H H S

CHUNG (H. L.) & LEE (C U) *Cysticercosis cellulose in Man with Special Reference to Involvement of Central Nervous System.*—*Chinese Med Jl* 1935 May Vol. 49 No 5 pp 429-445 [20 refs]

A study of 10 more cases of cysticercosis of the central nervous system.

Detailed accounts of the cases and their symptoms and cerebro-spinal findings are put out in tables. Palpable subcutaneous nodules were present in 8 in the other two they were seen in the brain at operation or necropsy. Epileptiform fits in 8 headache in 8 numbness or paresis in 5 fever in 5 nausea and vomiting in 4 transient motor aphasia blurred vision dizziness drowsiness or eosinophilia in 3. There was a tapeworm in 4 leucocytosis in 6 and bilateral papillitis with or without other signs in the fundi in 3. A condition of exophthalmic goitre in one was put down to cysticerci in the thyroid. As to the cerebrospinal fluid the pressure was between 80 and 350 mm of water leucocytes between 2 and 440 in the cmm. neutrophils in the same from 0 to 47 and lymphocytes from 53 to 100 per cent.

C L.

LINDEMAN (S. J. L.) & LYBURN (R. St. John) *Notes on Two Cases of Epilepsy due to Cysticercosis, with Other Suggestive Cases.*—*Jl Roy Army Med Corps* 1935 Aug Vol. 65 No 2. pp 116-123

There is description of 8 cases in all in a battalion which had come to Khartoum from India.

Two patients had fits with cysticerci 4 had nervous symptoms without cysticerci and lastly two had cysticerci whose discovery took place when every soldier was examined as the result of the finding of the other 6 cases.

C L.

DOGRA (J. R.) & AHERN (D. M.) *A Case of Cysticercosis.*—*Indian Med Gaz.* 1935 Sept. Vol. 70 No 9 p 510

Fits and nodules. Excision of a nodule made the diagnosis certain

C L.

MATEUURA (Toshio) *Ein Fall von Cyrticercus Cellulose Hominis.*—*Jl Oriental Med* 1935 Sept. Vol. 23 No 3 [In Japanese pp 627-629 With 1 plate [12 refs.] German summary p 36]

OCHOTERENA (I.) *Contribución para el conocimiento de la histopatología de la disticercosis cerebral humana en México.* [Histopathology of Cerebral Cysticercosis in Man in Mexico].—*An d Inst. Biol. Mexico* 1935 Vol. 6 No 2 pp 79-88. With 10 figs. English summary (4 lines)

Owing to the slow evolution of the cyst the cysticercus becomes enclosed in a chitinous capsule with a surrounding zone containing (mem)

material" at an interval of 6 to 122 days after the last injection. Twenty three dogs were given 1 to 5 doses of antigen, being a suspension of 1,000 to 20,000 scolices from fertile cysts, and fed with infective material 4 to 238 days after the last injection, and autopsy was made 24 to 131 days later. 10 had no infection and 5 had early infections. The Casoni reaction was useless in determining whether a dog had the tapeworm.

C. L.

DIXON (H. B. F.) & SOUTHERS (D. W.). *Cysticercosis (Taenia solium)*
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Aug. Vol. 64 No. 4, 5 & 6 pp. 227-234 300-306 373-
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ADAMS (A. R. D.) A Fourth Case of Human Infestation with *Bertella studeri* (Cestoda) in Mauritius—*Ann Trop Med & Parasit* 1935 Oct. 5 Vol. 29 No 3 pp 361-362.

A fourth Mauritian case of human infestation with *B. studeri* is recorded. The patient a Hindn boy aged 7 was in perfect physical and mental health in spite of his infestation. Treatment with carbon tetrachloride resulted in dislodgement of the worm. Direct feeding of gravid segments both freshly passed and after keeping for some days to a young *M. cynomolgus* failed to cause parasitization of the animal.

[The head was not found but no segments were being passed three months later] C L

SCHWID (Felix) Beitrag zur Technik der helminthologischen Untersuchung [Contribution on the Techniques of Examination for (Nematode) Worms.]—*Zent f Bak I Abt. Orig* 1935 June 14 Vol. 134 No 3/4 pp 150-151

A method for the collection of small nematodes from the contents of the gastro-intestinal canal.

First there is dilution of the contents with 1 per cent soda solution next stirring of this with a rod of glass or wood round which these worms become wound. They are unwound by movements of the rod in normal salt solution and may then be seen by the naked eye C L.

TAYLOR (E. L.) Do Nematodes assist Bacterial Invasion of the Host by wounding the Wall of the Intestinal Tract?—*Parasitology* 1935 May Vol. 27 No 2 pp 145-151

No 1 is the general answer to the question in the title.

The work carries on that of Taylor and PURCHASE (this Bulletin 1932, Vol. 29 p 81). *Bacillus suspensifer* was the organism which was used in testing the passage of bacteria into the rabbits blood from the intestine. In the first test 12 rabbits were given an infection with *Graphidium strigatum* a blood sucker and 12 were not all were then given by stomach tube 0.01 cc. of a 24 hours broth culture of virulent *Bacillus suspensifer*. Of those with *G. strigatum* infection 9 died and of those without 8 but 21 of them had also infections with the oxyurid, *Pseuderurus*. In the second test 27 rabbits were given infection with *Trichostyngolus retortaeformis* a blood sucker and 24 were not all were given by stomach 0.003 cc. of a like culture of those with *T. retortaeformis* there was death in 18 of those without 17 C L

DE BOER (E.) Experimenteel onderzoek betreffende *Ascaris lumbricoides* van mensch en varken. [Experimental Study of *Ascaris lumbricoides* in Man and in the Pig]—*Tijdschr v Diergeneesk*. 1935 Sept. 15 Vol. 62. No 18 pp 965-973 English summary

The author's investigation was undertaken to solve the question of identity or not of the ascaris infesting man and that of the pig and to determine the proportion of pigs infested with its own ascaris. He used young animals, some fed normally others on a diet poor in vitamin A. The following series of experiments were performed
 (1) Single feeding with eggs of *A. lumbricoides* from the pig (11 animals)
 (2) With eggs of human *A. lumbricoides* (5 animals) (3) Eight times

in successive weeks as in (1) (7 animals) (4) Seven times in successive weeks as in (2) (6 animals)

His findings may be summed up as follows. Repeated infection of piglets with ova of the human or the pig ascaris led to the presence of adult worms in the experimental animals, though neither natural nor experimental feeding with the ova invariably gave this result. Change of diet to vitamin A deficiency did not appear to affect this. The time for development from embryonated egg to adult worm was about 2 months.

Examination of earth worms (*Lumbricus terrestris*) living in ascaris-infested soil revealed ova of the latter in the intestine of the former and the author suggests that earthworms may play a part in ascaris infestation [but what part he does not specify]. H. H. S.

JONES (T. L.) & KINGSCOTE (A. A.). Observations on Ascaris Sensitivity in Man.—*Am. J. Hyg.* 1935 Sept. Vol. 22 No. 2 pp. 406-413.

The fact of ascaris sensitivity particularly in those who have worked with the worm is confirmed.

Twenty-seven out of 103 subjects, mostly veterinary undergraduates selected at random, gave positive reactions to a scratch-test with 5 per cent saline extract of pig ascaris. A period of exposure seems to be a necessary precursor and continued re-exposure may lead to at least partial desensitization. Various fractions of ascaris were similarly tested. In some subjects an eosinophilia followed the reaction.

A positive reaction is no indication of previous infection, although previous exposure by contact may be necessary. Continued exposure does not necessarily cause sensitization however. C. L.

McRAE (Anne). The Extra-corporeal Hatching of Ascaris Eggs.—*J. Parasitology* 1935 June. Vol. 21 No. 3. pp. 222-223

"The writer feels that the many reports of the hatching of ascaris eggs have been misleading i.e. that the hatching is evidently the effect of external conditions probably in most cases mechanical injury to the egg shell and should not be interpreted as biological hatching of the eggs."

The eggs of *Ascaris lumbricoides* from the pig were used. There was almost no "hatching" in 2 per cent. formalin, on changing from 0.2 per cent. HCl to 0.5 per cent. NaHCO₃ at 30° or 37°C., or on alternation between 0°C. and 40°C. Sometimes "spontaneous" hatching in cultures took place once on a great scale when a sand culture was taken some hundreds of miles by car—the probable explanation being that this was the effect of the rubbing of sand grains against the eggs. Tests showed that there was "hatching" even to 80 per cent. in 10 minutes when embryonated eggs were stirred in wet sand or when there was shaking with shot or beads. This kind of hatching came about more readily when there had been solution of the outer shell by antiformin. Freed larvae were dead within two days even in Ringer's solution at 37°C. [It seems strange that the paper has no mention of the work of Brown which too was done at the School of Hygiene and Public Health, of the Johns Hopkins University (this *Bulletin* 1929 Vol. 26, p. 548). In his experience all eggs "hatched" when wetted after drying, another and seemingly the most important physical cause for this, and one which may have acted in McRae's cases of "spontaneous" hatching.] C. L.

INDIAN MEDICAL GAZETTE. 1935 June. Vol. 70 No 6 pp 333-334—Ascaris Infection and the Bore-Hole Latrine.

After discussion on the necessity for sanitation in putting an end to ascaris infection, and on the reviewer's opinion formed from the facts that carriage of this infection may be by air, the author gives reasons for his belief that the bored hole latrine is the kind most likely to be successfully used by primitive peoples.

Experience having made it clear that deworming without good sanitation sees a treated man with the old weight of infection back again within three months right sanitation is clearly the key of the question. Recently Clayton Lane has collected one or two records which indicate the possibility that imperfect sanitary measures actually lead to an increase in infection rate with ascaris. The two principal instances quoted by Lane are one of his own finding in the Darjeeling district some years ago and the other in some small villages in Panama.

Clayton Lane suggests that the ascaris eggs are air borne and enter the houses to contaminate the food. [After making the statement that this suggestion came in fact from Stiles the reviewer under the heading Breathing in of embryonated eggs said But what is here in mind is infection by inspiration the breathing in of embryonated eggs as dust.] But this suggestion seems of doubtful accuracy in Panama at all events for there the rise in infection rate occurred at the height of the wet season. [In Panama Cort et al gave these egg counts for sanitiated Sardina July 1926 23 190 August 1926 7 170 September 1926 15 830 February 1927 48 540 (this Bulletin 1930 Vol. 27 p 421) And again There are two seasons in Panama, the dry from January to April and the rainy from April to December (Cort et al this Bulletin 1930 Vol. 27 p 431)]

If air-borne carriage of eggs after the installation of inadequate latrines is the correct explanation of the failure to reduce or to even cause an increase in ascaris infection the bore-hole latrine should not be open to this objection especially if bored deep enough to enter the sub-soil water a condition which will apply in the plains of Bengal and Assam.

If bore hole latrines reach the sub-soil water and not too many individuals use each one complete liquefaction of faeces will occur and the liquefied matter will percolate through the soil and so be completely lost. [A bored hole latrine is only a pit latrine made in a special way 18 inches wide often with a lining of basket work bat entering the subsoil water If the user is markaman enough to hit the water at the bottom perhaps thirty feet away he pollutes the general and moving subsoil water the drink of most persons in the tropics. If he has the usual half liquid stool of these parts the shrapnel effect will spatter the walls of the tube up to within a few inches of its top from which place air carriage should take place readily if it can take place at all.]

C L

NAIR (P. Kumaran) An Epidemiological Study of Ascaris Trichuris and Hookworm in a Coastal Village in Puerto Rico—Puerto Rico Jl Public Health & Trop Med 1935 Sept. Vol. 11 No 1 pp 118-138. With 4 figs. & 1 plan. [Spanish version pp 139-157]

A study of the infections mentioned in the title made during the summer of 1932 at Salinas on the south coast of Porto Rico.

The soil is sandy the rainfall less than 45 in. yearly there is much irrigation large areas of land are below high tide level and the soil is believed to have a high salt content. There are 73 families mostly white and all are very poor. Egg counts were made of 299 out of 362 persons using 0.005 gm. of faeces. In only 4.6 per cent. were hook-worm eggs seen [an obvious understatement] 73 per cent. harboured trichuris with an average count of 4,500 eggs to the gram the figures for ascaris being 44.6 and 19,200. Graphs show the distribution by age and sex. Of the 73 families 59 took water from the city the others from a protected deep well proved free from pollution—23 families had latrines, 18 kept them clean and used them, most persons old and young went out to defaecation sites. In the map one of them bears the legend defecation spot and playground for children and the text says of it that it "formed a big common backyard for the houses, where children played and defecated alternately and indiscriminately." Twelve backyards had no soil pollution but embryonated ascaris eggs were found in soil samples from five of them. Most families with a low degree of ascaris and trichuris infection lived at some distance from the defaecation sites. Of 20 families free from ascaris infection soil pollution of yards was absent in 19 and such pollution is held to be the chief cause of infection C. L.

CALVO FONSECA (R.) KOTRI (Pedro) & BAINUEVO (Jose G.) Porcentaje y distribucion geografica del parásitismo intestinal en Cuba. (Provincia de Pinar del Rio) [Intestinal Parasitism in the Province of Pinar del Rio (Cuba)]—Rev. Period. Clin. y Lab. Habana 1935 Nov.-Dec. Vol. I No. 2 pp. 206-211

Altogether 896 faecal examinations were made [the population of the district is not mentioned but the latest figures obtainable are 301,000 in June 1928] and 612 or nearly two-thirds (62 per cent.) contained parasites protozoal or helminthic. Protozoa only were seen in 64 (6.5 per cent.) worms only in 440 (44.6 per cent.) and both in 109 (11.0 per cent.) The detailed distribution in 14 townships of the Province is given in a table. The commonest was Trichuris, found in 400 of the total (40.5 per cent.) then in order Ascaris 23.5 per cent., Necator 15.4 Enterobius 1.9 *Taenia saginata* 0.4 per cent. (4 cases only) Trichuris and Ascaris were both present in 96 or 9.7 per cent Trichuris and Necator in 4.5 and all three in almost the same proportion, 4.4 per cent.

More attention was given to search for helminthic infestation than for protozoa, but the fact is mentioned that *E. histolytica* was found in 8 Giardia in 26 and *E. coli* in 148. Although we know that *E. nana*, *Chilomastix mesnili*, *Trichomonas hominis* are fairly common in Cuba, we did not look particularly for them our investigations being concentrated on searching for worm infestation." H. H. S.

KIRK (J. Balfour) & CANTIN (A. Y.) Intestinal Obstruction by Round-worms following Administration of an Anthelmintic.—*Brit. Med. J.* 1935 Aug. 17 pp. 298-299

Another case of intestinal obstruction from a knot of ascarids.

A boy of 10 had severe colic after "he had taken a mixture of chenopodium and castor oils," and at operation the usual "bag of worms" was found and emptied. Cases in the literature are cited. From their rarity the suggestion is made that not only worms and anthelmintic but some third factor is necessary C. L.

ROTTER (Werner) Zur Frage der Auswanderung von Spulwürmern durch die gesunde Darmwand. [Penetration of the Healthy Intestinal Wall by Ascaris]—*Swiss Med Woch* 1935 Oct. 11 Vol. 82. No 41 pp 1640-1641

Rotter's belief is that ascaris can force a passage through the healthy intestinal wall.

The case in question was a child of 3 with inflammation of the abdominal wall. At necropsy the jejunum and first part of the ileum formed a sort of sausage filled with 200 ascarids. In the first part of the jejunum was a perforation about 1 cm across the mucosa undermined, the hole in the muscle oblique and surrounded by a fibrotic mass and showing the muscle fibres torn apart with much polymorphonuclear leucocytosis. There was a haemorrhage about the left suprarenal, and small ones in the lungs in which no ascaris larvae were seen.

C L.

UJINE (Naoki) A Case of Empyema caused by Heterotopic Parasitism of an *Ascaris lumbricoides*—*Taiwan Igakkai Zasshi (Jl Med Assoc Formosa)* 1935 Sept. Vol. 34 No 9 (366) [In Japanese pp 1390-1395 [54 refs.] English summary pp 1396-1397 With 2 figs. on 1 plate.]

Ascaris infestation is very common throughout Japan and the author states that he has collated records up to the end of 1934 of 207 cases of ectopic parasitism by this worm. Only 6 of these were instances of invasion of the pleura. He now places on record another a boy of 3 years operated upon for empyema. On the third day after operation a mature but small female Ascaris emerged from the wound. The worm was only 16 cm. long but there were many fertilized ova in its uterus. Professor YOKOGAWA gave his opinion as follows 'It seems likely that this worm attained sexual maturity in the intestinal tract and after copulation escaped from there and strayed into the pleural cavity probably a month previous to the operation. In these abnormal surroundings further growth of the body has been arrested but development of the generative organs continued until ability to oviposit was reached. In the pus were also *Bac col* and *Staph aureus*'

H H S

ZWIRN (D) JOYEUX (Ch.) & ABOOCAYA (A.) *Ascaris lumbricoides* dans la cavité pleurale au cours d'une pleurésie purulente [*Ascaris lumbricoides* in an Empyema]—*Marseille-Méd* 1935 June 5 Vol. 72. No 16 pp 701-715 With 4 figs.

When an empyema was opened, a dead male ascaris came out with the pus. In the faeces were eggs of ascaris and trichuris.

C L.

DE AZEVEDO (A. Penna) Ascaridiose hepatica. [*Ascaris lumbricoides* in the Liver]—*Mem Inst Oswaldo Cruz* 1935 June Vol. 30 No 1 pp 115-122. With 6 plates. [17 refs.] English summary

The author describes a case of liver ascariasis in a girl 1 year old who also presented intestinal parasitism by 54 adult specimens of *Ascaris lumbricoides*.

"The hepatic lesions consisted in several abscesses containing living adult worms along with dead specimens and in the formation of an inflammatory condition with pronounced production of fibrous connective tissue and lymphocytic infiltration. Special attention is attracted by the fact of the existence of numerous eggs of *Ascaris lumbricoides* in the innermost of the inflammatory tissue. The inflammatory foci met with are closely connected with the biliary ducts. The presence of eggs of *Ascaris lumbricoides* is found even within the epithelium. Apart from the zones affected by the process of ascariasis, the hepatic tissue is seen to be well preserved." C. L.

STANKUS (Hugh S.) An Ascaris Infection. A Case in which the Diagnosis and Cure were effected by Mictaki.—Post-Graduate Med Jl 1935. July Vol. 11 (New Ser) No 117 pp. 247-253 With 1 chart.

The mistake was a needling of the liver carried out by a resident medical officer.

The symptoms were in short fever enlarged liver with pain and tenderness, coated tongue, cough and sometimes rhonchi, and wasting. There were no ova in the stool. Two days after the needling an ascari was passed and after santonin 3 more adults. Their sex is not stated. The suggestion is made that the needle hit the worms, whereupon they actively left the bile ducts. C. L.

INNENBERG (Heinz E.) Drei Asthaden-Fälle.—Schweiz Med Woch 1935. June 28 Vol. 65 No 26 pp. 600-602.

SASAKI (Tomio) A Case of Carbon-Tetrachloride Poisoning.—J. Public Health Assoc Japan 1935 May Vol. 11 No 5 pp. 1-3.

Another case of death from carbon tetrachloride given in herd fashion by the village authorities, "ascaris being present but unknown."

A woman of 41 had 2 cc. of the drug fasting and 3 hours later 80 cc. of 20 per cent magnesium sulphate. At 4 p.m. vomiting and diarrhoea came on. Her death took place a week later vomiting with and without ascarids in it being frequent the last act being collapse with coffee-ground vomit in which were more of these round worms.

C. L.

HOEPPLI (R.) Action of *Ascaris lumbricoides* Substance on the Growth of Fibroblasts in Vitro.—Acta Path. et Microb Scandinavica. 1935. Vol. 12 No 3. pp 281-289 With 3 figs.

As the result of carefully controlled experiments Hoeppli reaches these conclusions—

Extracts of fresh *Ascaris lumbricoides* muscle and of female sexual organs prepared with Tyrode's solution furthermore *Ascaris* body fluid and salt solution in which worms had lived for four days influenced unfavorably in varying degree chicken fibroblasts (chondroblasts) *in vitro*. Since the pH of the various liquids used for the experiments was within the range suitable for fibroblast cultures, it could therefore not be responsible for the unfavorable action. The possibility that perhaps highly diluted *Ascaris* body fluid might stimulate the growth of fibroblasts was excluded by a series of experiments.

The results obtained with Ascaris may serve as a basis and control for experiments with other helminths which are known to cause more severe lesions of the surrounding tissue. If substance of such worms will show an unfavorable action on cells *in vitro* the results obtained with Ascaris should be considered before one regards such an action as specific.

C L

MAPLESTONE (P A) The Rate of Development of Hookworm Eggs.—
Indian Med Gaz 1935 July Vol 70 No 7 pp 368-370
With 1 fig

A note to impress on students that there is quick development of eggs in the stool in the tropics the text book 4-celled egg being uncommon.

Eggs isolated by D C F in salt or sugar solution were washed and put on one side in April and May. The shortest times for hatching noted were 5 and 10 hours. The rate was much different from day to day in stools from the same person. It seemed quicker in eggs thus isolated than in those left in the stool and to be no different when floatation was in salt or sugar.

C L

STÉVENEL (L) & BERNI (P) Action de la cyanamide de chaux en solution à 3/1000e sur les ankylostomes. [Action of Calcium Cyanamide on Hookworm Eggs and Larvae]—*Bull Soc Path Exot* 1935 Oct 9 Vol 28 No 8 pp 714-715

This solution cyanide of calcium 1 in 3 000 prevented hookworm eggs from developing into embryos or destroyed within 3 days all larvae which had been allowed to develop.

C L

CHANDLER (Ara C.) A Review of Recent Work on Rate of Acquisition and Loss of Hookworms.—*Amer Jl Trop Med* 1935 May Vol 15 No 3 pp. 357-370 With 3 charts. [13 refs]

This critical review of the available data on seasonal fluctuations in level of hookworm infection when reinfection is discontinuous or ceases seems to me to indicate that there actually is a very decided fluctuation.

This implies that a climate which affords a favorable and an unfavorable season for acquisition of hookworms leads to a considerable annual exchange of old worms for new. The data suggest, however, that in communities where an equilibrium has been reached there is no marked increase in egg output until about six months after reinfection has occurred. In the past it has commonly been assumed that the effect of reinfection would be reflected in egg output in from six to eight weeks which is the time required for oviposition to begin. As soon as the egg production of the new worms has reached a high point however it falls off again very rapidly presumably due to the host's resistance beginning to operate on the six-months-old worms causing their expulsion at a rapid rate. If this theory is correct it would be expected (1) that sanitary reforms would be followed by a rapid lowering of the level of infection after about six months or earlier if the reforms were preceded by a season unfavorable for hookworm infection (2) that in the absence of sanitary improvement reinfection would occur fairly rapidly after treatment unless the whole community were treated and (3) that mass treatments given in a season when the ground is practically free from hookworm larvae would be of much greater benefit than one given when larvae are abundant in the soil.

C L

YAMASAKI (Mikio) Clinical and Experimental Studies on Hookworm Infection.—*Japanese Jl. Experim. Med.* 1935 Aug. 10. Vol. II No. 4 pp 457-470 With 17 figs. on 3 plates.

An attempt to find out whether there is a connexion between oral hookworm infection and "young greens disease."

"Young greens disease" Wakasabyo in Japanese, is seen as endemic in certain areas of the Tottori prefecture in late summer having as symptoms restlessness, nausea and sometimes vomiting. 3 or 4 days later they are lost and coughing comes on and may not be got rid of for months. In many of these sufferers hookworm eggs are seen in the faeces in large numbers about six weeks after the onset of symptoms. By a flotation method, seemingly an indirect centrifugal one, the percentages of hookworm infection in adults and children were—among farmers 62 and 12, and among town dwellers 15 and 7—the similar figures for ascaris were 65 and 55 and again 22 and 16. The rise of hookworm infection with age in farmers is put down to cutaneous infection through work on the land, a possible defecational infection not being mentioned while for ascaris this rise is absent "because the infection mode of this parasite is only in the oral way." After the giving of certain experimental results with heat and salt and of histological findings in optimum and non-optimum hosts fed on infective larvae there is a consideration of "young greens disease" thought to be "caused by the taking of young greens especially those of the radish variety which have been preserved overnight in a salted mixture. Hookworm larvae were seen on radish leaves, and it is said that no one before Yamasaki had noticed respiratory symptoms in oral infection. It is noteworthy that some of the illustrations show larvae in moth thoraces, the portal system having been in this way bypassed. C L

JACOCKS (W. P.) KENDRICK (J. F.) & STREET (W. C.) Hookworm Incidence and Intensity in South India by Districts.—*Indian Jl. Med. Res.* 1935. Oct Vol. 23. No. 2 pp. 441-448. With 2 maps.

The survey by Willis's technique alone or combined with that of Stoll, was made between 1920 and 1931. Its results are set out with maps after conversion to basis formed stools.

Of 15,178 hookworms 7.9 per cent. were *A. duodenalis*. There was a fairly low hookworm load with a fairly high incidence. C L

KHALIL Bey (M.) & SALAH (M.) Some Clinical Manifestations of Ankylostomiasis.—*Jl. Egyptian Med. Assoc.* 1935. June. Vol. 15 No. 6 pp. 378-388. With 2 charts.

Ankylostomiasis is the cause of symptoms from which a diagnosis of some organic disease may be made with danger to life.

A yellow skin with no suggestion of green no colouring of the sclera, no bile or urobilinogen in the urine and a normal icterus index. Anaemia with fever and heart murmur, the fever going away and anaemia becoming less under large doses of iron. Symptoms like those of duodenal ulcer but with the duodenal cap present on X-ray examination, these and occult blood no longer present after deworming. Symptoms as of gastric cancer or of enterocolitis. Those of nephrosis. Then there is mention of two acute cases with the usual syndrome and the making again of the point that the amount of anaemia is not parallel to the number of worms. C L

ZAU (F D) Meningism of Helminthic Origin. A Survey of 43 Cases apparently due to Infection with Helminthiasis and 2 Cases apparently due to Infection with Relapsing Fever—*Chinese Med Jl* 1935 July Vol. 49 No 7 pp 689-693 With 2 figs.

The presence of intestinal parasites chiefly hookworm and ascariis, may be the cause of a meningitic condition the proof being that with deworming the symptoms come to an end

The cases are really of 2 sorts—a meningism with no organisms in the spinal fluid though this was slightly turbid and a meningitis with micro-organisms and a cloudy fluid. With deworming there was recovery of all cases of the first condition and of 33 78 per cent. of 74 cases of the second so that this aim is of great importance in any case. Treatment was by 30 minims of oil of chenopodium. Two cases of meningism caused by *Sp recurrentis* are cited C L.

POGGI (Igino) Sull' infestazione da *Anchylostoma duodenale* nel comune di Vigevano (Nota preventiva.)—*Arch Ital Sci Med Colon* 1935 July 1 Vol. 16 No 7 pp 518-525 With 1 fig English summary (3 lines)

BONNE (C) Over een worminfectie van de submucosa van den dunnen darm. [Helminthic Infestation of the Submucosa of the Small Intestine.]—*Geneeskr Tijdschr v Nederl Indië* 1935 May 28. Vol. 75 No 11 pp 893-904 With 8 figs English summary

In 3 of about 3 000 necropsies on Malayan men and women in Batavia, Bonne has seen nematodes on the submucosa among haemorrhages.

Case I.—Many eggs and larvae of hookworm type and size.

Case II.—A worm 0.3 mm. across with buccal capsule and strong chitinous hooks and biting fiercely into the circular muscle. Only 3 sections available. Apparently an immature female or a male there being no eggs or larvae.

Case III.—Well developed buccal capsule with teeth and too much blood in it to clear properly. Worm about 0.6 mm. across. Eggs and larvae in submucosa. The man died of purulent peritonitis from a perforation in the wall of a very much narrowed part of the jejunum, 60 cm. below the pylorus. *Ancylostoma duodenale* is not so common in Batavia as is *N americanus* C L.

VAN SLYPE (W) Recherches pathologiques et thérapeutiques sur l'ankylostomiasis. [Ankylostomiasis. Pathological and Therapeutic Studies.]—*Ann Soc Belge de Med Trop* 1935 Sept. 30 Vol. 15 No 3 pp 421-467 With 4 figs. [38 refs.]

A detailed study of 48 cases of ankylostomiasis with special reference to blood loss material used quantitative diagnosis red cell and haemoglobin values lysins corpuscular resistance urobilinuria, bilirubinaemia pathology and slight infections.

In these cases care was taken to exclude as far as possible syphilis alcoholism and malaria. A discussion on blood loss versus toxins brings the conclusion that there is blood loss and that the nature of a possible toxin is as yet unknown. The material used was made up of 48 indigenous males between 18 and 40 years of age and mostly young. Under the heading ankylostomes are included *Ancylostoma*

Necator americanus and *Trichostrongylus* which locally have been found present in percentages of 74 63 19 and 10. Quantitative diagnosis was by Stoll's method using 0.01 gm. of faeces, it being noted that D.C.F. is more accurate but demands a more complicated apparatus. Anaemia was [as usual] more or less proportional to faecal egg numbers (a female being represented by 12 to 44 eggs to the gram) but with frequent and noteworthy exceptions; for the first and last items in the table show 200 3 87.5 and 800 6 90 for number of eggs millions of red cells and percentage of haemoglobin respectively. Reticulocytes [hématoïdes granuleuses] were present in 18 mostly in those with anaemia. As to lysins the pyramidal reaction (*ibid.* Bulletin 1933 Vol. 30 p. 670) is very variable present in 50 to 60 per cent. of those with "ankylostomiasis." Isolysins were absent in 5, present in 1 when the man's serum was used with red cells from a normal control, and in 6 when the man's serum was used with red cells from another man with this infection. Heterolysins were present in all of 15 cases examined and in the one normal control used. Of 27 cases the red cell resistance was normal or nearly so in 12, lowered in 3 and increased in 12. Urobilinuria was present in 20 of 23 cases and had no relationship to the number of eggs passed, bilirubinuria often increased, judged by van den Bergh's indirect reaction. Jaundice appeared 6 times in 48 after the giving of carbon tetrachloride, particularly in those with slight infections as judged by worm counts. Light infections are held to be of importance for two reasons. First, there are men with these numbers of eggs per gram, red cells (in millions) and haemoglobin 200 3 87.5 400 2.94 81 400, 24 82.5. Second, as Slype has been greatly impressed by the number of apparently healthy persons who come to him begging for the medicine to make their strong smelling carbon tetrachloride and they do this in spite of such deterrents as its taste and the febrile jaundice which is apt to follow it. He ends emphatically by urging that the discovery of eggs in the stool necessitates treatment, whatever their numbers. C. L.

LAVERGNE (J.) Le traitement de l'ankylostomiasis par la méthode italienne au chloroforme-huile de ricin. [The Chloroform-Castor Oil Treatment of Ankylostomiasis.]—*Bull. Soc. Path. Exot.* 1933 June 12. Vol. 28. No. 6. pp. 441-443

Chloroform-castor oil is the treatment of election for hookworm. This sweeping recommendation of an old remedy is based on 25 cases compared with oil of chenopodium in 18, there being no note of its ascaridole content, with thymol in 9 there being no mention of participation and of santonin in two. It was the only treatment after which worms were recovered in the stools and gave the lowest percentage of egg-containing specimens when faeces were examined by an unstated method 20 days later. Finally the author asks whether there is digestion of dead worms a question answered in the affirmative many years ago. C. L.

DE FREITAS (Octavio). Frialdade e anemia tropical. [Frialdade and Tropical Anemia.]—*Arch. Brasileiros de Med.* 1933 Sept. Vol. 25 No. 9. pp. 349-360.

"Frialdade" is a local popular name designating a disease brought over from Africa with the natives and characterized by a more or less

pronounced anaemia in fact ankylostomiasis. The word itself primarily meant chilliness and so figuratively coldness, dullness apathy. It has several other synonyms opilação (constipation torpor) cauçço (lassitude) inchação (swelling presumably oedema) amarellão (yellow probably the pallid tint of severe anaemia) cachexia africana and others—well recognized symptoms of severe hookworm infestation. This article is a Congress paper dealing with the subject mainly from the historical aspect.

H H S

TOKKING (H D) Ancylostomiasis in Digo District—*East African Med Jl* 1935 Aug Vol 12 No 5 pp 149-151

In Msambwene a selected healthy village there was a hookworm infection rate of 100. With the advised precautions the eggs in 1 cc. of faeces were counted by D C F [not D C F F]. The number varied from 2 to 3,800 with an average of 486 [and must have been many more] the mean haemoglobin to the Talquist scale was 60 in over 1,000 cases and the eosinophils in 50 unselected cases 13.46 Ascaris was present in 29 trichuris in 37 [Presumably the salt solution used was a saturated one with a specific gravity of about 1.200]

C L

PLUM (Denis) Observations on Ankylostomiasis and Anaemia in Kenya, with Special Reference to the Digo and Embu Districts.—*East African Med Jl* 1935 Sept Vol 12 No 6 pp 162-185 With 2 graphs. [35 refs.]

In the Msambwene Hospital, routine examinations of inhabitants of Digo District gave the following percentages of infection malaria 35 of 1,690 urinary schistosomiasis 51 of 421 ancylostomiasis 69 of 444 the percentages in males and females being near to one another. Of the 444 faecal tests the numbers of persons with other infections were ascaris 308 taenia 13 trichuris 180 strongylides 26 *S mansoni* 13 *E histolytica* 13 the quantity in use being a platinum loopful of faeces diluted when necessary with water.

The percentage of infection of Embu and Digo Districts the former measured by 1,946 smears at Keruguya hospital, are very different being respectively hookworms 6 and 68 [or 69] ascaris 79 and 17 tapeworms 34 and 27 urinary schistosomiasis negligible and 50 malaria 47 and 27. The species of plasmodium in the two villages were present in nearly the same relative percentages. Tables give the effect of various treatments on eggs in the faeces and on the anaemia. [As to these the reviewer is unable to bring himself to believe that the dosage used for carbon tetrachloride was really 40 cc. in most cases and for ascaridole up to 40 cc. so makes no reference to cure rates and regrets the use of the term ancylostomes to cover it seems all ankylostomes of whatever genus.] Plum's conclusions are these—

1. The anaemia of the Wadigo is an iron-deficiency anaemia effected chiefly by ancylostome infection of a people whose diet is deficient in iron.

2. The cure of the mass anaemia in Digo is dependent upon a radical alteration in the dietary in addition to anthelmintic treatment and satisfactory disposal of faeces.

C L

RODRIGUEZ MOLINA (R.) Treatment of the Anæmia associated with Hookworm Disease. Preliminary Report.—Puerto Rico Jl. Public Health & Trop. Med. 1935. Sept. Vol. 11 No. 1 pp. 49-55 [10 refs.] [Spanish version pp. 56-62]

A report on 5 cases showing the relative importance of iron and deworming for the cure of anaemia in heavy hookworm infection.

This paper was read at the meeting of the Pan American Medical Association held at San Juan Porto Rico in March 1934. The 5 cases all passed more than 1,000 hookworms after an anthelmintic, but before this they were in hospital for 40 days during which time blood examinations were regularly made. On admission there was a microcytic hypochromic anaemia with red cells from 1.5 to 3.5 millions and haemoglobin from 4.2 to 5.3 grams (29 to 36.4 per cent) by the Newcomer Klett instrument which takes 14.5 grams as 100 per cent. Daily two of them received 6 gm. of iron and ammonium citrate one 3 gm. of this, as well as a liver extract representing 350 gm. of fresh liver one 2 gm. of the iron salt and 8 gm. of a commercial gastrohepatic concentrate, and the 5th a full hospital diet only. While in hospital all gained weight all had a steady rise in blood values but only to a subnormal level, that is the red cells rose to between 3.5 and 4.3 millions and the haemoglobin to between 10.6 gm. (72.9 per cent.) and 12.2 gm. (83.4 per cent.) the highest value being in one of those taking iron and ammonium citrate 6 gm. and the lowest in the man on hospital diet. The anthelmintic was 2.5 cc. of carbon tetrachloride. Within a week of taking it the red cells began to between 5 and 8 millions in all, in the 2 cases taking 6 gm. of iron the haemoglobin rose to 15.3 and 16.3 gm. respectively (78 and 112 per cent.) in the others it remained about 11.4 gm. (78.4 per cent.) The two cases with full iron dosage were passing eggs 3 weeks later so that neither of them was really dewormed one lost blood values rapidly, the other showed further improvement in spite of the

C. L.

TEMPOXO (P.) Valore prognostico della v.d.i. e dei globuli rossi e dell'eosinofilia negli ankylostomiasici. [Prognostic Value of Red Corpuscle Sedimentation and of Eosinophilia in Ankylostomiasis] — Ann. d'Igiene. 1935 Apr. Vol. 45 No. 4 pp. 263-286

The author recorded last year the results of his investigations on the sedimentation rate of red cells in hookworm disease (see the Bulletin 1935 Vol. 32, p. 267) and he now follows this by a study of the value of this test and of the degree of eosinophilia in prognosis. His findings are based on 27 patients with ankylostome infestation and 7 free but belonging to families in which there have been cases recently. An acceleration of the sedimentation rate was demonstrated so long as the infestation continued, but on removal of the cause, i.e., getting rid of the hookworms the rate again became normal. The rate increase was not proportional to the number of worms but rather to the changes set up by them, since in certain individuals a few worms may cause profound alterations in the blood while in others a heavier infestation may cause little detriment and the sedimentation rate is affected only when the infestation definitely affects the blood.

The return to normal occurs in 2-3 weeks after removal of the worms. If the rate becomes normal and worms are still in the intestine, these are presumably male. As regards eosinophilia the author makes

no fresh addition to our knowledge that the degree of eosinophilia is unrelated to the amount of infestation. [The presence or absence of hookworms was determined by examination of the faeces but the technique of this examination is not stated in the paper]

H H S

MAPLESTONE (P. A.) & MUKERJI (A. K.) The Passage of Hookworms after Treatment.—*Indian Med Gaz* 1935 June. Vol. 70 No 6 pp 320-321

The discovery of no worm in the first stool after the taking of an efficient anthelmintic has been held to be a rough test of the need there had been for the giving of anthelmintics on a mass scale. Such a test gave in the authors' hands no demonstration that a man had been worm free and no idea of worm numbers if he had not.

The anthelmintic in use was tetrachlorethylene 3 cc. and oil of chenopodium 1 cc. in magnesium sulphate [see this *Bulletin* 1934 Vol 31 p 393] there is no note of the strength of ascaridole in the oil. The account is of 100 infected persons. The test of cure was that no eggs were seen by D.C.F. 10 days after treatment by this cure took place in 73. Numbering of eggs was done on all these persons before treatment and showed absolutely no correlation with the number of worms subsequently passed. Discovery of worms was by sieving. Of the hundred cases no worms were seen in the first stool in 42, but 5 of these went to stool within 15 minutes of taking the anthelmintic. In 55 fewer than 20 worms in all were seen and their discovery took place in the first stool in 28 of them in 45 with 20 or more worms the number was 30. Details are given of all these more weighty infections. The relation between the worms seen in the first stool on the one hand and in all of them up to 3 or even 4 days on the other was at the smallest 0-360 and at the greatest 80 in 84 234 in 252 219 in 233 and 182 in 199. The largest figures were 748 in 1,249 but in no case may they be taken as a suggestion of the numbers of all worms harboured.

C L

KIRBY SMITH (J. Lee) The Treatment of Creeping Eruption.—*Southern Med Jl* 1935. Nov Vol. 28, No 11 pp 999-1004 With 16 figs. [23 refs.]

The treatment most useful in destroying the larva of *A. brasiliense* in a creeping eruption is ethyl chloride freezing.

Kirby Smith has seen 5,000 cases of creeping eruption. For prevention in areas where the infection is common children should not go barefoot on wet soil nor should anyone sit on this. When the lesions are simple and without septic complications the area for 1½ in round the visible end of the burrow should be frozen for 2 to 4 minutes with ethyl chloride. A pencil of carbon dioxide snow is very painful and the vesicle heals slowly. With multiple lesions the ethyl chloride freezing should be applied only to a few at a time. If there is secondary dermatitis this must first be got rid of for otherwise the ends of the burrows cannot certainly be seen. There is an illustration of an ethyl chloride tube whose spray is under easy control. For discussion SHELMIRE had a preference for freezing for 30 seconds only at a time to avoid superficial necrosis but Kirby Smith did not think this was long enough for destruction of these larvae in the epidermis. [Kirby Smith has written To the present day it has not been demonstrated

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that man harbors this parasite. In 1913 the reviewer was the first to report the presence of the adult parasite in 3 of 30 prisoners coming to his jail from that of Mymensing Bengal [see this Bulletin, 1913, Vol. 2, p. 188] and in the same year noted that it was seen in the faeces of 9.3 per cent. of 150 treated prisoners at Berhampore, Bengal [see this Bulletin 1914 Vol. 3 p. 283]. AFRICA [see this Bulletin, 1932, Vol. 29 p. 882] has collected many instances of this infection in man, and SHELIMIRE in the discussion reported the probable occurrence of another case.]

C. L.

MALDONADO SAMPERIO (M.) La lucha contra la anquilostomiasis en la Sociedad de Peñarroya (1928-1932) [Hookworm Campaign in the Peñarroya Company's Mines]—*Medicina Pública Científica* Madrid, 1935 Aug Vol. 8, No. 8, pp. 361-384 11 figs.

These mines are situated in Spain, in the Province of Córdoba, Ciudad Real and Jaén. Among 1,782 men employed in 17 mines 883 or 50.6 per cent were infested with hookworm. In this article records in more detail are given for two mines in Córdoba, viz. El Antolín and San Rafael. At the former in an examination made in 1925 of 378 persons examined 234 or 61.8 per cent. and at the latter 243 among 311 or 78.1 per cent. were positive. In another table dealing with more recent figures of 895 examined at El Antolín 459 or 42.2 per cent. were positive the greatest degree of infestation being 53.7 among 196 between 25 and 34 years of age those between 25 and 29 having almost the same 53.8 as those of 30 to 34 years of age, 53.6 per cent. At San Rafael of 456 examined 257 or 56.3 per cent. were positive among those aged 20-24 years 48 were positive out of 56 (i.e. 82.1 per cent.) the next being between 30 and 34 years among 71 of whom 42 or 58.8 per cent. were positive.

As regards other helminth infestations at El Antolín among the same number (895) 52 harboured Trichuris (5.2 per cent.) and 23 or 2.3 per cent. *Hymenolepis nana* 11 or 1.1 had Enterobius. At St. Rafael 42 or 9.2 per cent. harboured Trichuris 16 or 3.5 *H. nana* and 7 or 1.5 per cent. Enterobius. [In none of these is the method of examination stated. It was probably by direct smear].

For treatment at first chloroform and castor oil were given, later oil of chenopodium and carbon tetrachloride were the chief drugs used, and of a total of 1,218 miners treated 1,182 were cured, a 97 per cent. success. Oil of chenopodium proved the most satisfactory. It was given before any food in the morning in a single dose of 1.5 gm. in gelatine capsules, and was followed 45 minutes later by 30 gm. of sulphate of magnesium. The patients were advised to take no food during the forenoon and to abstain from alcohol in any form during that day.

H. B. S.

ARAR (Asim) Les résultats de la lutte contre l'anquilostomiasis dans la province de Rizé (actuellement Tchorouk) en Turquie [The Hookworm Campaign in Rizé Province, Turkey]—*Bulletin Officiel International d'Hygiène Publique* 1935 Sept. Vol. 27 No. 8 pp. 1774-1778.

This campaign against the hookworm has now covered 133,408 sick. This paper is a continuation of that already noted [this Bulletin, 1932, Vol. 29 p. 420].

The gross clinical signs of ankylostomiasis were anaemia with red cells down to 700 000 and haemoglobin to 10 and an eosinophilia up to 35. The incidence to Stoll's technique is from 20 to 67 per cent [so must in fact be considerably higher]. Carbon tetrachloride is a better anthelmintic than chenopodium tetrachlorethylene or hexyl resorcinol. Its adult dose was 2 cc. and it has apparently been given without fatality [at least none is mentioned] and signs of intolerance were as if by magic, no longer to be seen after sulphate of soda (Na_2SO_4) was given in place of sulphate of magnesia (MgSO_4). Second and third treatments were given when faecal testing showed that eggs were still present and the percentage of infection [determined as above] has fallen from 50 to 8 after 3 treatments. Sanitation seems limited to leaving faeces in pits for decomposition to do its work. The parasite is named as *Necator americanus* C L

FOSTER (A O) The Immunity of Dogs to *Ancylostoma caninum*—
Amer Jl Hyg 1935 July Vol 22 No 1 pp 65-105
With 7 graphs. [11 refs.]

A dog's general condition is an important point in the prevention of hookworm infection. If this is good its resistance to infection is greater.

An earlier infection had no certain effect in the prevention of a test one, since in 2 experiments resistance was greater and in 3 was less. To free a dog of infection before giving it a test infection did not have an effect on the test infection. In other experiments light hookworm loads seemed to lead to a better resistance but 12 died of acute hookworm disease after repeated infection so that the belief is that with a heavy infection there may be predisposition to further infection. Age resistance was poor in an ill nourished litter.

C L

FOSTER (A O) Further Observations on Prenatal Hookworm Infection of Dogs.—Jl Parasitology 1935 Aug Vol 21 No 4 pp 302-308. [27 refs.]

The administration *per os* of single doses of infective larvae of *A caninum* to three pregnant bitches at intervals of 5 9 and 32 days respectively before parturition (gestation normally 63 days) resulted in prenatal hookworm infestations in all but one of twenty-one puppies. Although the mothers were very resistant to hookworms the puppies did not appear to be protected on this account. One litter of five pups was prenatally infected with the cat strain of *A caninum* as a result of administering larvae to the mother only two days before birth of the puppies. It is suggested that the occurrence of prenatal infection with parasite worms may be of economic and public health importance.

C L

FAUST (Ernest Carroll) Experimental Studies on Human and Primate Species of *Strongyloides*. IV The Pathology of *Strongyloides* Infection.—Arch Pathology 1935 June Vol 19 No 6 pp. 789-806. With 16 figs. [28 refs.]

For the last study see this *Bulletin* 1935 Vol 32 p 235. The scope of this one is shown in its title.

On account of the different views in the literature 62 dogs were given infection with a strain of *strongyloides* from man and kept

the more becomes the parasite." In 1918 the review was the fact to report the presence of the adult nematode in 8 of 50 patients found to be infested from those of Newengang, Bengal see the Bulletin 1918 Vol. 2 p. 155 and in the same year noted that it was seen in the faeces of 8 per cent of 130 treated patients at Dacca, Bengal see the Bulletin 1914 Vol. 3 p. 286. Similar see the Bulletin 1922 Vol. 3 p. 527 has collected many instances of this infection in India and elsewhere in the discussion reported the product mentioned in another case.

C. L

Argentina. See page 2. La lucha contra la anquilostomiasis en Argentina. In *Revista 1926-1932 Sociedad Compartida de la Peste y la Fiebre Amarela* - *Revista Police Cífer* Madrid 1935, Sept. Vol. 5 No. 8 pp. 261-284. Vol. 1 figs.

These names are assumed to mean in the Province of Chaco, Corrientes and Santa Fe since 1922 men employed in 17 were 523 or 7.4% per cent were infected with hookworm. In the next years no more detail are given for the names in Corrientes, in Chaco and San Pedro. In the former in an examination made in 1925 of 100 persons examined 204 or 51.4 per cent had at the time 206 named 571 or 41.1 per cent were positive. In another 100 dealers with more work hours of 1925 examined at El Amoroso of 42.2 per cent were positive the greatest degree of infection name 58.7 among 196 between 35 and 36 years of age, those between 25 and 26 having almost the same, 33.5 as those of 30 to 34 years of age 33.6 per cent. In San Pedro of 458 examined 25 or 5.5 per cent were positive among those aged 24-26 years 4.2 were positive out of 56 or 12.1 per cent, the next being between 31 and 34 years number 7 of whom 4.2 or 56.7 per cent were positive.

In reference other helminth infections, at El Amoroso among 100 some number 90.5 52 harboured Taenia (5.2 per cent) and 27 or 23 per cent. *Symphyurus* was 11 or 11 had *Echinococcus* at 5.1, larvae 4.0 or 4.0 per cent harboured Taenia, 18 or 18.2 per cent and 7 or 1.5 per cent *Echinococcus*. In none of these is the method of examination stated, it was probably by direct smear.

For treatment, in first chloroform and castor oil were given, 10 ml. of chrysopodium, and cod-liver oil emulsion were the chief drugs used and of a total of 1,238 names treated 1,152 were cured, 8.5 per cent success. Oil of chrysopodium proved the most satisfactory it was given before any food in the morning in a simple dose of 14 cc. in capsule capsules, and was followed 45 minutes later by 50 g. of sulphur of magnesia. The patients were advised to take no food except the forenoon and to abstain from alcohol in any form during their diet.

E. E. S

Iran. See page 2. Los resultados de la lucha contra la anquilostomiasis en la provincia de East (actualmente Tachrook) en Turquía. In *Revista Compartida de East Province, Turkey - Revista Oficina Central de Estadística Pública* 1925 Sept. Vol. 5. No. 8 p. 174-175.

The campaign against the hookworm has now covered 1954-1955. This paper is a continuation of that already cited the Bulletin 1922 Vol. 3 p. 420.

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On account of the different views in the literature 62 dogs were given infection with a strain of *strongyloides* from man and kept

under controlled conditions till they were killed or died. The skin lesions were unimportant. There was damage to the lungs in 29 per cent.—haemorrhage alveolar ruptures exudation of leucocytes into the air passages. This last is held to be bad for the host, because it imprisons larvae so that there is growth of them in the bronchi to full development with invasion of the palisade epithelium and birth there of young. But when there has been carriage of larvae to the digestive canal they form similar tunnels through the crypts into the stroma of the mucosa, mostly in the duodenum and jejunum but in addition in the stomach and even the rectum. In these tunnels there is oviposition and hatching and the larvae make their escape into the lumen of the intestine. Thus both mechanical and lytic damage is produced, at times effecting a honeycombing of the depths of the mucosa frequently associated with hyperplastic tips or even extensive sloughing of the entire area involved. The tissue reaction to the worms is encapsulation with phagocytosis by epithelioid cells.

Larvae attempting to invade the muscularis mucosae are immediately surrounded by an infiltration of cells resembling a pseudo-tubercle. Extensively damaged tissue in any zone is subject to fibroblastic repair. In all of these local actions eosinophils are conspicuously absent.

C. L.

BRACH (Ted de Vinne) Experimental Propagation of *Strongylidae* in Culture.—*Proc Soc Experim Biol & Med*. 1935. June. Vol. 32. No. 9 pp. 1484-1486.

So far as is known this is the first demonstration of continued propagation of the free-living phase of any species of *Strongylidae*.

The form was *S. tenuis* of New World monkeys. The culture medium was filtered nutrient agar 2 gm. extract in water of monkey faeces 25 cc. distilled water 25 cc. The belief is that males of the third generation were present.

C. L.

VALCIE (G.) Traitement de l'anguillulose par une cure combinée d'émetic et de violet de gentiane. [Treatment of *Strongyloides* Infestation by Tartar Emetic and Gentian Violet].—*Ann Soc Belge des Malad Trop* 1935. Sept. 30 Vol. 15 No. 3 pp. 387-390

With treatment and while under observation the stools became negative and the health good in 3 cases, in the fourth there were no such results. In the last, treatment was gentian violet 0.08 gm. three times a day for a week, in the others 0.1 gm. with tartar emetic. Eosinophilia was marked.

C. L.

CHANDLER (Asa C.) Studies on the Nature of Immunity to Intestinal Helminths. I. The Local Nature of the Immunity of White Rats to *Nippostrongylus* Infection. II. A Study of the Correlation between Degree of Resistance of White Rats to *Nippostrongylus* and Interval between Infections.—*Am Jl Hyg* 1935. July Vol. 22. No 1 pp. 157-168 pp. 243-258. With 1 graph.

So far as they seem to apply to man the conclusions may be put as these—no active immunity against these parasites is got by injection of serum of parasitized rats and that in "parabiotic twins" any

active immunity of one got by injections of worms is not present in its twin though there was good intermingling of blood. So the belief is that immunity is local in the mucosa, perhaps nutritional and possibly anti-enzyme in nature and may be a very widespread phenomenon. The tardy arrival of larvae in the intestines after 3 or 4 infections is not due to intestinal immunity but perhaps to some reaction of cells in the lungs and air tubes

C L.

HEADLEE (William Hugh) Studies on Infections of Human Parasitic Worms under Institutional Conditions.—*Jl Lab & Clin Med* 1935 July Vol. 20. No 10 pp 1069-1077 [11 refs.]

Using the smear Willis's floatation method and perianal scraping only one kind of infection *Enterobius vermicularis* was found in 876 examinations on 652 patients in a mental hospital in Illinois

In 89 examinations by faecal smear no eggs were found in 505 by Willis's technique 337 were positive in 282 by perianal scraping 21.99 per cent. were positive. Under the heading Institutional Environment and Helminthic Infections Headlee points out the cleanliness of the whole premises and surroundings and the fact that there is no previous examination on which to go in making up one's mind on the question of the way of carriage of this infection in the Institution and in doing so makes this statement Lane (1913) in reporting on the infections in prisons and jails of Bengal regards the possibility of infection in a jail as nonexistent. [The title of Lane's paper is Ankylostomes and Ankylostomiasis in Bengal and the title is the measure of its scope.]

C L.

LENTZE (Friedrich-August) Zur Biologie des *Oxyuris vermicularis* [The Biology of *Enterobius vermicularis*]—*Zent f Bakteriol* I Abt. Orig. 1935 Vol 135 No 1/3 Beiheft pp 156-159 With 1 fig

More consideration should be given to the air as a means of the carriage of *Enterobius* infection or reinfection

Carriage of this infection has taken place where the greatest care has been used in the washing of hands and in the arrangement of night clothes so that eggs cannot be carried from anus to mouth by the hands. Again for development the threadworm egg must come in contact with acid at one stage in its development. Yet this infection has persisted when all care has been taken for the prevention of hand-to-mouth carriage of eggs so that the suggestion has been made that contrary to the instinct which takes the females down to the rectum and out of the anus to oviposit another one or reversed peristalsis takes them up to parts of the small intestine where the reaction is acid and that there they make a stay of at least 6 hours—an unlikely thing to happen. Accordingly Lentze made tests of the possibility of carriage by air. A cardboard cylinder 80 cm. long and 20 cm wide (about 31 and 8 inches) had, while kept vertical, placed in its upper part folds of a torn nightgown on which eggs of this worm had been placed and two folds of which had been rubbed together. This cylinder he shook with the enclosed cloth at about the level of his head, set it down on a glass plate, took away the cloth and covered the top of the cylinder with a piece of cardboard. The tests were of two sorts. He replaced the glass under the cylinder with a new

one 30 seconds, 1, 2 and 5 minutes after the cloth had been taken out, and he washed out his nose. The eggs were first found on the glass at the bottom 2 minutes after the infected cloth was removed, that is to say their passage through 70 to 80 cm. of air took 2 minutes. In the washings from his nose 2 eggs were seen. He had shown already that these eggs pass through the meshes of material when this is closely woven. His belief then is that movements of an infected person in his night clothes or bed clothes carry threadworm eggs in eddies of air to a position where they are inhaled and that they reach the stomach by active wandering or by being swallowed. His view is that the usual anal ointments soothe itching mechanically but make it easier for the females to get to the outside through the anus.

C L

PEIXO (Giuseppe) Il ciclo di sviluppo degli Ossouri. Sua importanza in medicina pratica. [The Development of Enterobius—Its Importance in guiding Treatment].—Polichirico Soc. Ital 1935 Oct 7 Vol. 42 No. 40 pp. 1943-1946 1949 Vol 1 fig

The hypothesis is put forward that present ideas on the development of *Enterobius* are wrong—that the fertile female makes her way into the intestinal wall and there oviposits, larvae hatch and make a passage into the lumen where there is growth to the adult stage. In this way is explained the absence of eggs from the faeces, while as to know there is some hiding place for them. Treatment based on the hypothesis is detailed. [It is a fact that passage of pregnant female ovovitracts per rectum (that is from the lumen of the intestine) is a commonplace and that in favourable conditions they may then be seen ovipositing on a microscope slide.]

C L

HOLF (L. O.) & EDNER (J. M.) Minimum Time required by *Trichinella spiralis* to produce Infective Larvae.—Jl Parasit 1935 Aug Vol. 21 No. 4 pp. 313-314

In a series of rats fed by stomach tube with 5,000 trichines, encysted larvae were first seen in the diaphragm on the 17th day and were at that time infective to other rats.

C L

GOLDWATER (Leonard J.) STEINBERG (Israel) MOST (Harry) & COVETTY (Joseph E.) Hemoptysis in Trichinellosis.—Am Eng Jl of Med 1935 Oct 31 Vol. 213 No. 18 pp. 849-851
[Summary appears also in Bulletin of Hygiene]

Pulmonary signs or symptoms occur in half the cases of trichinellosis, that haemoptysis also occurs though it has been reported and that produced experimentally is not generally known, and the author does not mention in text-books of medicine nor does trichinellosis enter into discussion of the causes of haemoptysis or in the case of pulmonary tuberculosis. Hence the recording of these symptoms and history were Vol. 22 II and the presence of trichinella was proved by biopsy.

So far as thigh eosinophilia in all, over 30 per cent. In each case as these—no attack was a fairly late symptom, 23 days after ingestion of serum of parasited pork and about 21 after the initial symptom.

Trichinella was not found in the expectoration which was examined in two cases. ASKANAZY in his experimental work found them localized in the lungs and FROTHINGHAM nearly 30 years ago reported finding them at autopsy in the haemorrhagic areas of the lungs of a patient dying with trichiniasis.

H H S

SPINK (Wesley W.) *Cardiovascular Complications of Trichinosis*.—
Arch Intern Med 1935 Aug Vol 56 No 2 pp 238-249
 With 4 figs. [21 refs.]

Acute myocarditis occurring in trichinosis may be a nonspecific inflammatory reaction due to the invasion of the myocardium by larvae.

A review of the literature shows that other cardiovascular manifestations include congestion and hemorrhage of the eyes, lungs and gastrointestinal tract, edema, thrombosis, embolism with infarction and hypotension.

Six of eighteen cases of trichinosis (33.3 per cent.) showed electrocardiographic changes. These changes included an initial flattening or inversion of the T wave especially in lead II, the wave subsequently becoming upright, low amplitude of the QRS complex, and intra-ventricular block.

The postmortem changes in a fatal case of trichinosis with myocarditis are presented. Another case is recorded in which trichinosis was complicated by a permanent right hemiplegia.

C L.

THEILER (Hans) AUGUSTINE (Donald L.) & SPINK (Wesley W.) *On the Persistence of Eosinophilia, and on Immune Reactions in Human Trichinosis, Several Years after Recovery*.—*Parasitology* 1935 July Vol 27 No 3 pp 345-354 [28 refs.]

The results of differential counts, precipitin tests and skin reactions 4 to 9 years after recovery from trichinosis.

The antigen was diluted to 1 in 10,000 in terms of dry powder and the injection was of 0.1 cc. of this in alkaline phenolized salt solution, the control injection being by an equal quantity of the extracting fluid (Coca's solution). In the precipitin test 0.2 cc. of serum was overlaid by 0.2 cc. of 1 per cent. dilution of *Trichinella* extract. Of the skin reactions 2 were negative and 5 positive of precipitation reactions 2 were negative (the same as were negative to skin test) 4 were positive by flocculation with no definite ring and in 1 the serum was cloudy. In 6 in which it was tested the eosinophilia was 0, 5, 5, 2, 2, 7.

C L.

WANTLAND (W. W.) *Effect of Irradiated Ergosterol and Galetum Lactate on Calcification of *Trichina* Cysts*.—*Proc Soc Experim Biol & Med* 1934 Dec Vol 32 No 3 pp 438-444
 With 6 figs.

The treatment of trichinosed rabbits with these substances is of value.

The optimum dose of irradiated ergosterol is 30 to 60 drops every other day. With it there is as much calcification after 3 months as there is normally in 9 months and the physical state of the treated was better than that of the untreated. Yet the animals may be given too much with death from calcium rigor the symptoms being quick pulse, great weakness and dyspnoea.

C L.

TRAWIŃSKI (A.) Studien über Immunität bei Trichinose. [Immunity to *Trichinella* Infection]—*Zent f. Bak.*, I Abt. Org. 1835 June 14 Vol. 134 No. 3/4 pp 145-149 [20 refs.]

The serum of rats which 25 to 35 days earlier have been in receipt of a heavy trichina infection is a strong preventive of infection in rabbits. C. L.

HU (Stephen M. K.) Preliminary Observations on the Longevity of Infective Larvae of *Wuchereria bancrofti* Cobbold in *Culex fatigans* var *pallens* Coquilletti.—*Chinese Med. J.* 1935. June. Vol. 51 No. 6. pp. 529-536.

This work carries on that of Hu and YEN [this Bulletin 1935 Vol. 32 p. 646] and gives proof that living infective larvae were present in this mosquito 79 days after infection, the time at which the last of the test batch lot was put to death.

Between 10 p.m. and 11 p.m. mosquitoes had a blood meal from a man in whose blood 69 and 62 microfilariae were present in every 20 cmm. at those hours. 22 mosquitoes were put to death between day 10 and day 83. Mosquitoes with heavy infections have lived for a considerable length of time. After a blood meal there was development of infective larvae of *W. bancrofti* in *Culex fatigans pallens* and of *Dirofilaria immitis* in *Anopheles punctipennis*. Repeated infections may take place. C. L.

KARAMCHANDANI (P. V.) The Effect of Heat and Atmospheric Humidity on all Stages of *Culex fatigans*.—Records of the Malaria Survey of India 1935 Mar. Vol. 5. No. 1 pp 23-33. With 7 charts & 3 figs.

The author has determined in the laboratory what temperatures are fatal to *Culex fatigans* at all stages of its development.

No comparative study of the lethal temperature for each stage in the life-cycle of an insect has previously been made. The author finds that the lethal range is sharply defined in each case. The eggs all hatched at and below 39.8°C. above this temperature, none hatched. For larvae exposed for one hour the fatal range was 36°-38°C. at 37°C., 50 per cent. died. Pupae were more resistant, with a range from 38°-40°C. In the case of adults exposed for one hour, the fatal temperature was lower in dry air than in moist 37.4°C. at 0 per cent. relative humidity 38°C. at 90 per cent. in the females and about a degree lower in each case for the males. This adverse effect of dry air is attributed to desiccation. He produces some evidence that the males cannot conserve water so well as females. The results are all tested statistically. T. B. Wigglesworth.

HU (S. M. K.) Studies on the Susceptibility of Shanghai Mosquitoes
" Experimental Infection with *Wuchereria bancrofti* Cobbold.
albopictus Skuse, II.—*Armigeres obtusus* Walker.—
Hist Bull Peking 1935. June. Vol. 9 Pt. 4
[18 refs.] [Summarized in Rev Applied Entom.
Sept. Vol. 23. Pt. 9 p. 213.]

carried out in Shanghai during 1933-34 mated
Skuse, and *Armigeres obtusus* Wlk were
hour on a person heavily infected with *Filaria*

(Wuchereria) bancroftii and were dissected not less than 5 and usually more than 10 days later.

The following is taken from the author's summaries. Of 62 *A. albopictus* fed, 48 contained dead immature forms in the thorax and abdomen 4 of which had undergone chitinous encapsulation. Of 102 *A. obturans* 81 contained dead microfilariae in the thorax and abdomen most of which were chitinised. 11 contained chitinised encapsulated larvae of the sausage form. Filarial larvae developed to the infective stage in *Culex pipiens* L. fed at the same time on the same case. Dissections of 383 examples of *A. obturans* and 27 of *Aedes albopictus* collected during 1933 from houses in the Woosung area revealed no filariae although examples of *C. pipiens* from some of the houses were infected.

FENG (Lan-Chou) Intermediate Hosts of *Microfilaria malayi* in Chekiang, China.—*Proc Soc Experim Biol & Med* 1934 Dec. Vol 32. No 3 pp 494-496.

The best host for larval development of *Filaria malayi* was in these tests *Anopheles hyrcanus sinensis*.

In *A. h. sinensis* larvae became infective on the 6th day at temperatures of 29° to 32°C of 44 given infective feeds and still living on that day 30 were harbouring infective filariae and in 14 of them their habitat was the labium. In *M. (Mansonioides) uniformis* only a small number came to full development most becoming granular and degenerated on the 5th day. In 3 other mosquitoes common and blood-suckers namely *Culex pipiens* *Aedes albopictus* and *Anopheles obturans* microfilariae did not go to full larval development.

C L

FENG (L. C.) & YAO (K. F.) Observations on Filariasis in Huchow, Chekiang, China.—*Chinese Med Jl* 1935 Aug Vol. 49 No 8 pp 797-801 With 1 map

1 Of 2112 patients admitted to the Huchow General Hospital in Huchow Chekiang, from October 1932 to August 1933 44 or 2.08 per cent. were positive for microfilariae in their blood.

2 Of the 44 positive cases 38 showed infection with *Microfilaria malayi* 2 with *Microfilaria bancroftii* and 4 were mixed infections.

3 Light infection with *Microfilaria malayi* in patients whose physical conditions were healthy and whose sleeping habits were normal, showed a definite nocturnal periodicity. In one heavily infected tuberculous (pulmonary) case who was very much debilitated and whose sleeping habit had been irregular for 2 months microfilariae were found all the time in the peripheral blood.

4 The distribution of the two types of filarial infection in the Chekiang Klangau border is discussed.

C L

SCHREEPE (F. L.) De verspreiding der Filariasis in Indragiri (Residentie Riouw en Onderhoogheden) [The Spread of Filariasis in Indragiri (Sumatra)]—*Geneesk. Tijdschr v Nederl Indië* 1935 July 22. Vol 75 No 15 pp 1197-1201 With 1 plate.

Indragiri is situated in the middle of Sumatra and possesses a total population of about 50 000 dwelling for the most part along the river. The author began his investigation in 1930 and proceeded to determine the number of filaria carriers kampung by kampung. He also used the abundant material of two estate hospitals. A total of 5,519 persons were examined from the high lands of Indragiri. Night blood

alone was examined with the result that 990 about 18 per cent, proved to be positive carriers of the *Microfilaria malayi* described by Brug. These carriers showed manifest elephantiasis in 80 cases. An examination however of the night blood of 43 persons with enlarged limbs furnished only four positive microfilaria carriers. Abscesses and infiltrations were met with in 18 out of 70 microfilaria carriers who were free from elephantiasis but the microfilaria itself was never found in the pus. The two chief mosquito species met with were *Taeniorhynchus annulipes* and *T. uniformis* of which the former was much the commoner type. Treatment is only symptomatic.

W. F. Harvey

SNIJDERS (E. P.) Over een geval van filariasis. [A Case of Filariasis]—*Arch. Tijdschr. v. Geneesk.* 1935. June 22. Vol. 79 No. 25 pp. 3024-3030 With 7 figs. on 1 plate.

A straightforward case of filariasis is here used in a clinical lecture to illustrate certain points of the disease. The patient, a man of 22 years of age was in apparently good health, and due to return to his work in the Belgian Congo. He had no organic disease and no Wassermann reaction but showed an occasional albuminuria and 54 per cent. eosinophilia. There were no casts in the urine no increase of blood urea and nothing to note as regards heightened blood pressure. Only the two symptoms remained, together with the locality of his work, to point to a possible cause. Examination of the faeces showed no eggs no larvae and no proglottides. There remained to be excluded schistosomiasis. An examination of the day blood provided a definite diagnosis, for there were shown to be present *Microfilaria losi* and *Microfilaria peruviana*. The method of examination was to add 1 to 1 cc. blood to 10 cc. of a solution with the composition—Sod. citrate 300 mgm. saponin 100 mgm. normal salt solution 100 cc. In this the erythrocytes are haemolyzed and the microfilariae brought down in sediment by centrifugation.

A discussion follows on the cause of albuminuria, which was obviously not dependent on a kidney lesion. The explanation offered is that this may be due to the formation of "Calabar-swellings" in the capsule of the kidney or the bladder wall.

What decision was to be made about allowing the man to return to his work? He had already spent 11 years in the Congo was therefore experienced in the dangers of the life there. Moreover the probabilities of his being infected in this region, even had he had no infection already were high for this is placed at 90 per cent. It was useless attempting to cure the condition and the condition is known sometimes to cure itself with time. On these grounds then there seemed no reason to refuse the man permission to return to his work.

W. F. H.

DE AMICIS (Arturo) Un caso autoctono di filariasi da "Filari Bancrofti" osservato in Italia. [An Indigenous Case of Filariasis bancrofti in Italy]—*Giorn. Ital. di Malat. Exot. e Trop.* 1935. July 31 Vol. 8. No. 7 pp. 167-169 With 2 figs.

The author records the case of a peasant aged 27 a native of Gambatesa, Campobasso (in the Apennines, north-east of Naples), who was suffering from elephantiasis of the genitalia with lymph

scrotum hydrocele and slight chyluria. Bodies believed to be embryos of *W. bancrofti* were found in the urine and in the blood by day as well as by night. The patient had never visited the tropics had not even been away from his native country H H S

[The bodies in the microphoto purporting to be microfilariae in the blood correspond to these neither in details nor proportions —C L]

WRIGHT (R. E) SEETHARAMA IYER (P V) & PANDIT (C G) Description of an Adult Filaria (Male) removed from the Anterior Chamber of the Eye of Man.—*Indian Jl Med Res* 1935 July Vol. 23 No 1 pp 199-203

The worm agrees in its morphological features with the previous descriptions of the male of *W. bancrofti* except as regards a few minor details which would not appear to be of specific importance.

The details of the case were given by WRIGHT [this *Bulletin* 1935 Vol 32, p 474]. The description of the worm would have been clarified by camera lucida drawings. C L

KHALIL Bey (M) The Aetiological Role of Filariasis in Endemic Funiculitis and Hydrocele in Egypt.—*Jl Egyptian Med Assoc* 1935 June Vol 18. No 6. pp 389-396 [14 refs.]

A survey in Kafr Ghatatu a village 14 km west of Cairo on the edge of the desert with endemic filariasis.

The blood of 958 of the 1033 persons living there was taken between 9 p.m. and midnight. *Wf. bancrofti* was present in 26.5 per cent. (28.6 in males 24.4 per cent. females) hydrocele in 25.7 per cent of 475 males the percentage of microfilariae in these being 24 as against one of 30.3 per cent in those who had no hydrocele Thickening of the spermatic cord was present without hydrocele C L

MONTESTRUC (E) & BERTRAND (Ch.) A propos d'un cas de lymphangite tropicale [Tropical Lymphangitis.]—*Bull Soc Path Exot* 1935 July 10 Vol. 28. No 7 pp 612-614

A large plaque of lymphangitis [? lymphatic oedema] on the antero-internal aspect of the thigh suppurated, was opened, and let out half a glass [? some 5 oz] of pus containing streptococci. [The attention of readers of the *Bulletin* is called to this because there is often a tendency to regard all elephantoid conditions in a filarial district as due to the helminthic infestation.—Ed.] C L

MENON (T Bhaskara) *Maharaja's of Travancore Curzon Lectures* (University of Madras) (1934-1935) Problems in Filariasis. With a Foreword by Major-General Sir Frank Powell CONNOR, Kt DSO K.H.S F.R.C.S I.M.S Surgeon-General with the Government of Madras—pp vi + 67 With 22 figs. (1 coloured) on 16 plates. [107 refs.] 1935 Madras Printed by Thompson & Co Ltd. [Re 1]

In these 3 lectures the note on which Menon makes his start and his end and to which his attention is frequently given between is

that there are many spaces in our knowledge of Bancroftian filariasis. These he clearly points out, as well as the need for accurate and co-ordinated study before the spaces are full.

Lecture I.—Though elephantiasis arabiun is such a common name the first description of the disease, and a good one comes from India by SUSHRUTA in the Vedic and Brahminic periods of 600 B.C. After historic observations such as Maxsov's suggestion that the infective larva escaped from the mosquito into water and was drunk, attention is given to the epidemiology namely "small circumscribed foci where the infection rate is very high, but neighbouring areas with very similar climatic conditions show only a lower incidence." Menon is in doubt as to the whole explanation being that physical conditions of heat and moisture of air are or are not right for the development of the larva in the mosquito and its transmission to man, and makes the suggestion that many of the facts now hard of explanation become easy if there were discovery that the infective larva can effect entry of the skin from water. Explanation is needed of the different clinical types of disease met with in different areas—is it one of different parts of the skin being used as the place of entry in different areas, or is it ascribable to different species of worm, or to different degrees of infection, or to the use of different lines of passage in the body? Though the discovery of clinical signs is largely dependent on the doctor's acuteness, "symptomless filariasis" is probably the result of a slight infection and elephantiasis the end result of long and wide lymphatic blockage. Stress is laid on a gap of knowledge in the life-cycle—What happens to the infective larvae after they enter man? How do they as so many do get to the scrotum?

Lecture II is on the problem of microfilarial periodicity. Menon adds a little to the evidence that female worms in the same host are in the same stage of microfilarial development and that in one case microfilariae were absent from the uterus when the worms were removed at 2 p.m. On the whole, Lane's theory rests on the demonstration of a burial ground where the microfilarial brood in the blood are disposed of every day. This has got to be carried out. [The reviewer suggests again that primarily the theory rests on the evidence for or against simultaneous daily parturition in the female worms. When workers are satisfied as to this, then and only then will they begin an adequate search for the site and means of destruction of microfilariae.] The point is next raised whether parturition is after all a daily event, but may not be the cause of the periodic attacks of filarial fever? What is the stimulus which produces cyclical parturition (or indeed periodicity if this is not due to parturition)? It is significant that in the year 1935 it should be possible for Menon to say rightly "on the whole, histiological studies of the lymphatic glands are so few that it is not possible to decide whether the changes could be directly attributed to toxic and foreign body reactions round the parent worms [or microfilariae] or ... to a toxic discharge from the worms lying at some distance" or as ACTON and RAO suggest to passage of infective larvae.

Lecture III—(1) The pathology of elephantiasis including mention of the effects of the injection of sclerosing fluids by HOOTON, DUNN and FIELD showing the effects of the mechanical factor and of secondary infections. (2) Methods of diagnosis, including the measured drop the intradermal reaction interfered with in India by present difficulty in getting the antigen X-rays in which radiograms are correlated with

the results of sectioning and the adhesion phenomena of PANDIT PANDIT and IYER. (3) Treatment of a general vermicidal character which has proved disappointing by local injection of sulpharsphen amine and by operation. The last section urges the great need for further accurate and co-ordinated studies which at last this great subject will evidently receive.

C L

- i. DRINKER (Cecil K.) AUGUSTINE (Donald L.) & LEIGH (Octa C.) On Filtration of Microfilariae by Lymph Nodes.—*Trans Roy Soc Trop Med & Hyg* 1935 June 29 Vol. 29 No 1 pp 51-58 With 3 figs.
- ii. KNOTT (James) The Periodicity of the Microfilaria of *Wuchereria bancrofti* Preliminary Report of Some Injection Experiments — *Ibid* pp 59-64
- iii. LANE (Clayton) A Note on Periodic Bancroftian Filariasis.— *Ibid* July 31 No 2 pp 135-142. [16 refs.]

i. *Microfilaria immitis* passes through lymph glands of the dog with comparatively slight hindrance and without phagocytic infiltration of the glands. *Mf loa* though sheathed travels on a slide faster than the unsheathed *Mf immitis*. By analogy *Mf bancrofti* will not measurably be impeded by lymph glands and if mechanically checked in them will not suffer thereby.

Mf immitis collected by centrifuging heparinized and haemolysed blood of an injected dog were resuspended in a mixture of dog serum and normal saline such that the protein content lay between 1.2 and 2.8 per cent. figures normal for the leg lymph of the dog. With precaution for maintenance of its evenness this suspension was run into the lymph afferent of the popliteal gland of a dog. The outgoing lymph was collected either by cannulation of the efferent lymphatic of this gland or of the thoracic duct. A typical experiment of each sort is detailed in two tables these show that when 16 141 larvae were run into the popliteal gland during 85 minutes 125 reached the outgoing vessel and 16 016 did not. Again when 88 252 were run into this gland of another dog during 114 minutes 1 400 reached the thoracic duct and 88 852 did not. In these last experiments the perfusate was coloured with trypan blue which had no observable effect on the activity of the embryos. It thoroughly stained both popliteal and iliac glands and it and embryos appeared in the thoracic lymph at the same time. There was then passage of the perfusate through both structures. In entire cross sections of perfused glands 8 μ thick there were small numbers of embryos, mostly in intermediary sinuses and with evidence of reaction in no case. In 3 experiments microfilariae were imprisoned in the popliteal gland by ligature of the outgoing vessel. The microfilariae survived this treatment with great success. We cannot at present furnish any estimate as to the number that may have escaped from the node by migrating. In none of these instances of imprisonment [which reached to 5 days] was there the slightest evidence of phagocytosis.

As to motility paths of travel on a slide plotted out for the unsheathed *Mf immitis* showed progress of 0.18, 0.16, 0.19 and 0.14 mm. per minute the blood coming from a heparinized dog and for the sheathed *Mf loa* 0.37 mm. One larva has penetrated the vaseline with the anterior third of its body directed into the vaseline. These observations

show beyond possible question that sheathed microfilariae are capable not only of movement but also of actual travel, and that their travel is forcible as indicated by the organism which penetrated the vasicle.

It is reasonable to believe that the ease with which [Dirofilaria] traverses lymph nodes would be equalled by *Loe* and that the embryos of *H. heterioria* would be expected to pass to the blood stream as readily as those of *Loe* with "no serious check in passing through lymph nodes. Further experiments with *Uf. immitis* are in progress.

C. L.

ii. (1) A series of experiments is reported in which blood containing microfilariae was injected into non-filarial human subjects.

(2) A method of blood examination for microfilaria is described.

"(3) Microfilariae were found to have great difficulty in passing through the peripheral capillaries.

(4) Microfilariae are less active in day blood than in night blood. It is suggested that because of this they are not able to work their way through the capillaries in the daytime, hence the mechanism of nocturnal periodicity.

(5) In one subject the injected microfilariae lived 14 days and observed typical nocturnal periodicity.

"(6) In another subject who showed clinical signs of filariasis, the injected microfilariae (which were injected into the brachial artery) never passed through the peripheral capillaries. This suggests an acquired resistance to the parasites, and that in an immune patient the microfilariae are stopped in the capillaries and perish there.

(7) In a subject showing elephantiasis the microfilariae survived only 2½ days.

iii. Clayton Lane deals with the chief points in the two preceding papers and with other matters relative to this important and interesting question—the periodic appearance of embryos of *U. bancrofti* in the peripheral blood.

The author considers first the optimum habitat of the adult filaria, as shown by examination of "local spots" places which are painful during an attack of elephantoid fever or of lymphangitis in infected persons. Some of these "spots" when examined after excision contain calcified worms. O'Connor has related that three-fourths of the filariae were in the periglandular lymph vessels or in the capsule or cortical sinuses of the glands (see also this Bulletin Vol. 29 pp. 427-785). Rowett's view that if adult worms are found outside the sex organs they have arrived there after death is discussed and shown to be erroneous by a concrete example to the contrary and one positive must outweigh theoretical negatives.

The author does much to clarify the difficulty by his simile of two escalators—the lymph and the blood, fronting an infective larva after it has penetrated the human skin. If it chooses the former it may be brought to a stop somewhere in the slow lymph current in arm, thigh, leg, or a lymph gland, and there grow to an adult. If it elects for the latter it is carried by the circulation to a "suitable" capillary (a term not definable at present) passes through the vessel wall into a lymphatic in the tissues and there develops. If it does not penetrate the capillary wall it passes on in the blood stream till it either finds a resting place for development or dies.

After birth in the lymph embryos reach the blood by the ordinary route of the circulation or by taking a short cut through the walls

of the lymph and blood vessels. The weight of evidence is against the embryos passing through a lymph gland and in favour of their bypassing the gland itself by the use of the new collateral lymph vessels which form in these cases.

DRINKER AUGUSTINE and LEICH have argued that embryos of *Dirofilaria immitis* pass easily through the lymph nodes and that by analogy those of *W. bancrofti* will do the same but Clayton Lane shows that their own figures do not bear out the former and that arguments by analogy are not valid evidence in this instance at least. Of many thousands of larvae injected into the afferent lymph vessel of the popliteal gland less than 1 per cent. appeared in the efferent vessel, 99.2 per cent. were not accounted for in another experiment nearly the same proportion 98.4 per cent. were lost. Three possibilities as to their fate are arguable 1. They were retained undamaged in the gland 2. They were destroyed in the gland 3. They had escaped. Section of the glands disproved the first and second of these.

KNOTT's argument that the embryos are less strong in day than in night blood and are kept back in the capillaries by day is not proven but is moreover disproved by his own experiment of injecting embryos in large numbers into the blood vessels of a man at 10.40 p.m. and examining the blood at intervals over a period of 48 hours no embryos were found. A second experiment on somewhat similar lines was corroborative of the same findings.

As regards the periodicity Lane's view is a daily parturition of the female worms at about the same hour and not that parturition is more or less continuous. The former hypothesis would account for the recurring wave of embryos in the blood stream the latter would not. The question as to the site where the embryos are destroyed remains unanswered. [See also this *Bulletin* 1935 Vol. 32, p. 274.]

H H S

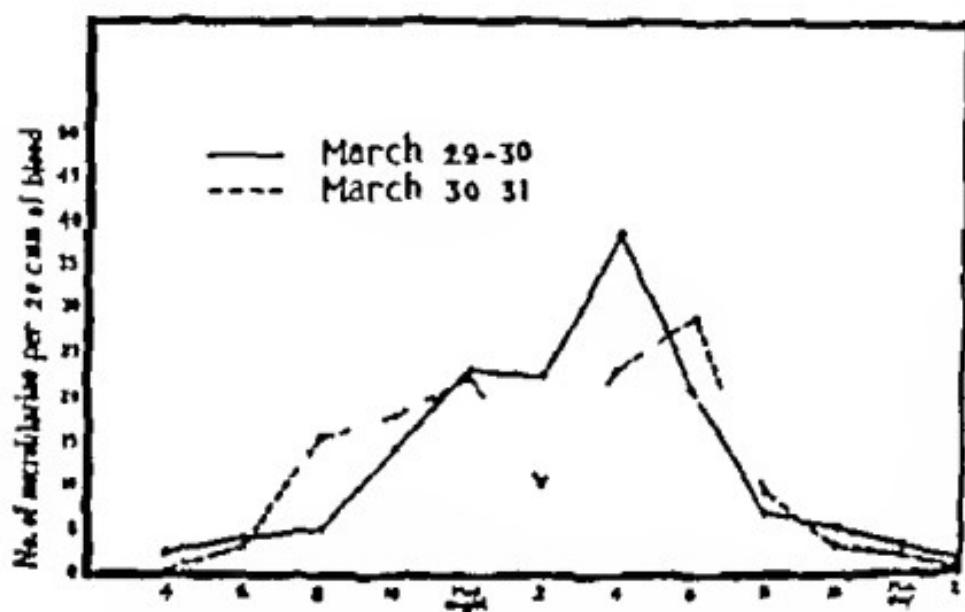
AFRICA (Candido M.) GARCIA (E. I.) & LAYCO (Jaime) Periodic Human Microfilariae in the Philippines.—*Jl. Philippine Islands Med Assoc* 1935 Aug Vol. 15 No. 8. pp. 407-412. [11 refs.]

There is in fact periodicity of human microfilariae in the Philippines. Counts were made of 2 cmm. of skin blood every 2 hours at intervals from August to January in a man who had never left the islands. Periodicity was marked. It is thought that both periodic and non-periodic forms of *W. bancrofti* are possibly present. It is suggested that in this case there may have been 4,585,000 microfilariae in the whole blood and as to periodicity and its explanation by daily parturition his comment is "for the daily death of such an enormous number of larvae is bound to cause grave disturbances in the host analogous to the so-called protein shock which does not seem to occur in filariated persons. Furthermore the theory seems unbiological, since it would be a piece of great folly on the part of Nature to permit such wholesale death when clearly these microfilariae need to stay longer in the circulation in order to have more chance of getting into the mosquito host. [But in that case man's well being may have been in Nature's mind.]

C. L.

LEN (C. H.) & CHANG (T. L.) The Periodicity of *Microfilaria malayi* Brug as observed from a Case in the Lester Chinese Hospital, Shanghai—Reprinted from *Liaognan Sci. Jl.* 1935, July Vol. 14 No. 3. pp. 399-402. With 1 fig.

The periodicity in the two cases tested was marked. In one of them 20 c.c.m. of blood was taken two-hourly for 48 hours. The graph shows the numbers of microfilariae.



Periodicity of *Microfilaria malayi* Brug from a Lester Chinese Hospital Case.

[Reproduced from the *Liaognan Science Journal*]

C. L.

MONTEL (M. L. R.) & TUONG-VAN-QUE. La carbone animal intraveineux dans le traitement des accès aigus fiévreux de la lymphangite chronique éléphantiasique des pays chauds. [Injection of Animal Charcoal in Elephantoid Fever].—Bull. Soc. M. Chirurg Indochine. 1935 Apr Vol. 13. No. 3. pp. 271-276.

Three cases are added to that already reported (Montel, this Bulletin 1935 Vol. 32, p. 649). In all of them there was equally dramatic disappearance of lymphangitis and fever. They ceased within 24 hours, with immediate relief of the general symptoms and restoration to full health in 3 days.

C. L.

HORNAN (E. Harold). Studies on the Dog Heartworm, *Dirofilaria immitis*, with Special Reference to Filarial Periodicity.—Am. J. Trop. Med. 1935 May Vol. 15 No. 3. pp. 371-383. With 1 chart. [16 refs.]

A report is presented of data on *Dirofilaria immitis* infestation obtained by blood examination and subsequent autopsy of 83 dogs. It has been found that there is no correlation between the numbers of microfilariae in the peripheral blood stream and the numbers of adult female filarial worms present. A single female may account for several million embryos or may be responsible for only a few thousand at 5 p.m. The writer has

been unable to demonstrate the presence of a substance in the salivary glands of four species of mosquitoes which possesses a chemotactic effect upon the embryos of *Dirofilaria immitis*. A dog under observation in screened animal quarters continued to exhibit a constantly high number of microfilariae over a period of three years. *Aedes aegypti* will develop the larvae of *Dirofilaria immitis* to an infective stage but in very carefully controlled experiments this species of mosquito was unable to transmit the infection to three dogs. The young larvae after inoculation into a dog by mosquitoes must undergo development in some location other than the heart since this organ contains only adult worms or nearly mature ones. It is believed that in the case of the dog heartworm cyclical parturition of the adult female filarial worms is not a major factor in the production of periodicity. This is substantiated by the long life which microfilariae may show following transfusion into an uninfected host and also by the enormous numbers of embryos per female worm which may appear in the dog's blood. Probably normal physiological processes in the dog account for the phenomenon of periodicity of microfilariae.

[Since in the body of the paper the reviewer's opinions are questioned it seems fair to say that his suggestion has been that the first step needed before drawing analogies between the periodicity of *D. immitis* and *W. bancrofti* is to have knowledge of the condition of the uterus of *D. immitis* at different hours comparable to that which O'COVOR has given for *W. bancrofti*. If there is no such timing of parturition in *D. immitis* but some secret place of hiding a series of dogs can be put to death at given hours and comparative and controlled counts made of the blood of different parts or organs. Indeed these can be punctured while the dog is alive with even greater ease. In the reviewer's opinion surmise should have a smaller place in explanation of periodicity in the dog's worm. The constancy of microfilarial counts from day to day seems to him to be no stronger evidence of the daily reappearance of the same microfilariae in the blood than would be the idea that the constancy of daily counts of hookworm eggs in the faeces could be evidence that the eggs somehow got back into the intestine from day to day. MANSOV hardly originated the theory of diurnal parturition of microfilariae he condemned MYER's suggestion (1881) of the possibility of diurnal solution as the end of such embryos as do not come within mosquito range. The fact that in HINMAN's paper the approximate number of microfilariae in the blood per female worm discovered varied in 15 dogs from 10,740 to 3,750,945 suggests that worms were living in places other than the heart, as it is stated they may.]

C L

HINMAN (E. Harold) Experimental Studies on Filarial Periodicity --
Jl Trop Med. & Hyg 1935 Nov 1 Vol. 38, No 21 pp 285-267 {17 refs.}

In *Dirofilaria immitis* it is most improbable that cyclical parturition accounts for the phenomenon of filarial periodicity.

No evidence of cyclical parturition could be found by examination of the uteri of large numbers of female worms at different periods of the day or night. The long life of microfilariae *in vivo* (as shown by transfusion) and *in vitro* as well as the presence of enormous numbers of microfilariae per female worm, is submitted as evidence in opposition to this theory. The hypothesis of chemotactic effect of salivary secretion upon microfilariae has not been supported by experiments with *Dirofilaria immitis*.

The writer again reiterates his belief that periodicity in the dog heartworm is probably influenced by normal physiological processes in the animal. The elevation of the dog's body temperature as much as 4 F and maintenance for two or more hours failed to have any effect upon the numbers of microfilariae in the peripheral circulation.

C. L.

COUTELEN (F) La longévité de la filaire *Loa loa* (Guyot 1778) et des embryons de filaires. A propos d'un cas de filariose dure. [Longevity of *Loa loa* and its Embryos].—Bull. Soc. Path. Exot. 1935 Feb. 13. Vol. 28. No. 2. pp. 128-134 [36 refs.]

A case of *Loa* infection followed up in France for 7 years.

A woman who had left the French Congo in September 1924 first showed Calabar swellings in hands, arms and eyelids in January 1931, but no microfilariae in the day blood on 8 occasions. In April 1931 a *Loa* crossed the conjunctiva and was taken out, 15 days later a second and on 27th November a third did the same and were all taken out. Next day *Mf. loa* was first seen in the blood at 11.30 a.m. with an eosinophilia of 8 per cent. the note being made that the appearance did not take place till ten months after that of the oedema, and 7 years and 2 months after she had left the Congo. In a table are set out the length of life of the adult worm in the experience of 13 observers—between 4 and 15 years.

C. L.

RODEAUX (J) & VALCRE (G) Quatre nouveaux cas de parasitose par *Onchocerca volvulus* chez l'Européen. [Four More Cases of Infestation of Europeans by *O. volvulus*.]—Ann. Soc. Belge de Med. Trop. 1935 Sept. 30. Vol. 15. No. 3. pp. 361-355. With 2 figs.

In all cases microfilariae were present in the fluid from punctured nodules, but in none were they seen in the skin though pruritis was marked in all. In 1 case an injection of 2 per cent. novocaine and 0.5 per cent. of novocaine was made into a nodule. When this was cut out 5 days later the worms were dead and shrunken with invasion by leucocytes.

C. L.

D'HOOGHE (M) Contribution à l'étude de l'onchocercose humaine dans l'Uélé. [Onchocerciasis in Man in Uele (Belgian Congo).]—Ann. Soc. Belge de Med. Trop. 1935 June 30. Vol. 15. No. 2. pp. 159-199. With 12 figs. on 4 plates & 1 map [5 pp. of refs.]

Blinding onchocerciasis is present in the Lower Uele.

Of adults 88 per cent. show nodules mostly on the trunk and about the pelvic girdle and only 5.7 per cent. on the head. Of 3,448 natives of the place 2.1 per cent. had eye trouble and about 0.5 per cent. were blind. Microfilariae were present in the bulbar conjunctiva in 59 per cent. of those with nodules on the head and in all of those who had eye symptoms. Owing to the presence of other infections dependence cannot be placed on dermal reactions. The skin symptoms leading up to scleroderma are held to be allergic, microfilariae playing quite a secondary rôle in causing them. When these are seen in cerebro-spinal fluid the belief is that they have been carried there during the puncturing. Injection of 0.5 to 1 cc. of 5 per cent. thymol in carbon

tetrachloride causes destruction and absorption of nodules. Photographs show the skin conditions and one varicose lymph gland though whether the last was a pure onchocerca infection is not stated.

C L

APPELMANS (M) Les troubles visuels dans l'onchocercose africaine [Visual Disturbances in African Onchocerciasis]—*Rer Belge Sci Med* 1935 Aug-Sept Vol. 7 No 7 pp 525-539 [22 refs.]

An account clinical and pathological of the blinding filaria in Africa.

Three arguments were put forward by BRUMPT when making *O. caecutiens* a species different to *O. rotundus*—medical geography, the situation of nodules the pathology. They do not seem to Appelmans to be of weight. As he has seen the disease in Africa it has 3 stages. The first is that of the forming of subcutaneous nodules which are seen on the head in 5 per cent of cases. In the second lesions of the skin are seen and with them the presence of microfilariae in the skin. In the third are the eye lesions in 3 stages. The first is with photophobia much congestion at the limbus and back to the equator of the eyeball punctiform infiltrations about the limbus but the centre of the cornea clear microscopically are seen at the limbus much cellular exudation all round the vessels the conjunctiva with full vessels oedema, the outer third of the cornea with blood vessels and cellular exudation mostly in the superficial levels. In the second stage of the eye lesions there is inflammation of iris ciliary body and choroid with some loss of sight caused by bodies some of them microfilariae in the vitreous and the usual lesions of iritis and choroiditis. The third happily not always come to blindness with atrophy of the eyeball, entrance of microfilariae into the sheath of the optic nerve and lesions inside it.

Microfilariae may have round them tissue which is quite healthy. Their ill-effects are perhaps due to their movements and to toxins. Most of them are seen at the limbus in the ciliary body and conjunctiva, in the nerve sheath but not in the nerve or retina, there are few in the cornea or sclera. That is they are mostly present where connective tissue is loose and not made up of parallel bundles.

C L

JOYEUX (Ch.) SÉDAN (J) & ESMÉNARD (J) Un cas d'onchocercose contractée à la Côte d'Ivoire avec complications oculaires. [Ocular Symptoms in a Patient with Onchocerciasis in the Ivory Coast.]—*Bull Soc Path Exot* 1935 June 12 Vol. 28 No 6 pp 435-438

The ocular trouble seems to have been limited to the conjunctiva, since vision was normal.

A forester of 35 had a skin eruption a nodule under the skin over the left scapula and some lesions on the left conjunctiva. These last were made up of an elongated body 7 mm. long by 1 mm. broad, motionless yellowish and pointed at one end, and of a dozen small rounded bodies like yellow grapes some of which were also present in the right conjunctiva. Three of these were cut out two placed in saline without emigration of embryos and the third sectioned. It proved to be a granuloma with many giant cells. The scapular nodule contained a

tangle of *O. volvulus* worms. There were no microfilariae in the blood and the eosinophils lay between 47 and 33. A detailed note will be published in *Annales d'Oculistique*.

C. L.

OSBORN (H. A.) Onchocerciasis in England.—*Lancet*, 1935, Nov 2, p 1000.

The title of the paper makes clear the author's view of the case.

A man of 62 who had never been out of Liverpool had for 5 years a scrotal swelling. Its quick increase in size in the last six months had made him uncomfortable. A hydrocele was present. Orchidectomy was undertaken. In cystic fibrous tissue was seen a larval nematode measuring 240 μ by 7 μ , without a sheath and with the tip of the tail free from the nuclear column. There was no eosinophilia and no microfilariae in the blood. The diagnosis was onchocerciasis, the man was a cotton porter at the docks and the suggestion is that he was bitten by an infected *Simulium* which came to the country in a cargo ship. [The reviewer by courtesy of Dr. Osborn has seen the slide. The solitary larva is complete though coiled, lies in a recess in the tissue, has a long tail sharply pointed and the nuclear column is not reminiscent of that of *Off. volvulus*. There were apparently no nodules under the skin and no examination of lymph from the dermis was made for embryos. The reviewer has seen hundreds of sections made by O'Connor and has not once seen a whole microfilaria in them. He regrets that on the grounds put forward the claim is made for this as a clear case of onchocerciasis got in England.]

C. L.

LEONARD (K.) Un ver de Médine siégeant au voile du palais.—*J. Soc. Path. Exot.* 1935, June 12, Vol. 28, No. 6, pp. 433-441.

CASSENS (E.) Ueber Gnathostoma beim Menschen in Siam [Gnathostoma Infection of Man in Siam].—*Arch. f Schiffs- u. Trop. Hyg.* 1935 Aug Vol. 39 No. 8, pp. 337-342.

The author's experience is based on about 40 cases of this infection. The outstanding points in it are eosinophilia without helminths in the intestine, and frequently with circumscribed transitory swellings. The percentage of eosinophils has been between 19 and 82, and it is generally but not always highest early in the infection of neutrophils 11 to 62 and these commonly have a shift to the left, of lymphocytes 7 to 33. The swellings may be as big as the palm of the hand, are generally right under the skin with redness and pain, but may be deeper lasting from 2 to 3 days to 1 to 4 weeks and then come to view again not far from where they were first seen. Lung and brain symptoms have been seen in these infections.

C. L.

WATTS (C. H.) & GORRIE (Rachael) A Gongylonema Infestation in Man.—*J. Amer. Med. Assoc.* 1935 July 6 Vol. 105, No. 1 pp. 23-24 With 1 fig.

A male gongylonema was taken by a white man of 30 from the roof of his mouth "which had been sore for 3 months."

The authors belief is that it is the first male gongylonema got from man. Six weeks later the nervous symptoms which the man had had

were gone and the palate had healed. Some measurements of the worm are given. The microphotographs make it clear that the worm is a gongylonema, but little more.

C L

FAUST (Ernest Carroll) & MARTINEZ (William H.) Notes on Helminths from Panama. II Rare Human Nematode Eggs in the Feces of Individuals from the Chagres River, Panama.—*Jl Parasitology* 1935 Oct. Vol. 21 No 5 pp 332-336. With 3 figs. [10 refs.]

Eggs of *Capillaria hepatica* and of *Gongylonema* were seen in faeces and were probably contaminations.

C L

FRASER (W. A. Carr) The Comparison of the Efficiency of Anthelmintics.—*Parasitology* 1935 Oct. Vol. 27 No 4 pp 465-475

TROPICAL DERMATOLOGY

A REVIEW OF RECENT ARTICLES II.*

Blastomycosis.—Since 1931 CARRIÓN¹ has seen six cases of Chromoblastomycosis in Puerto Rico. In one of these, a male white agricultural labourer the clinical picture differed from that usually seen. The disease first started on the left wrist some twenty years ago and had since then slowly involved most of the hand, forearm and elbow. The lesions were patchy and psoriasisiform intermingled with extensive zones of scarring. No nodules or vegetative masses were present. The histological changes were typical but the fungus isolated by culture appeared to constitute a new species and will be the subject of a later communication. In the meantime it is proposed to call it *Hormodendrum compactum*. The first case of Chromoblastomycosis to be recognized in Uruguay is described by MACKENZIE². He also reviews the disease generally and in particular from the point of view of world distribution. ROSENTHAL³ has published some details of a remarkable case of blastomycosis seen in Philadelphia, where the infection is rare. The patient was an infant aged six months in whom the lesions had appeared three weeks before coming under observation. Apparent cure resulted from six months treatment with potassium iodide and X-rays. The greater part of the paper is devoted to details of histology and morphology the organism being the *Cryptococcus gilberti*. TORRE⁴ has written a long paper concerning the pathology of a specimen, a small skin tumour obtained from Liberia. No clinical notes are appended but the microscopical features of the nodule and of the mycotic elements are given in very great detail. The fungus presents appearances which would seem to relate it to both the yeasts and the coccidioides. The paper also describes a new method of fixing such preparations which allows the subsequent use of a great variety of stains.

Mycetoma.—During the past twelve months two cases of "Madura foot" have been detected in Eastern Europe. ILDRIM⁵ reports the first case from the U.S.S.R. a native girl from the Northern Caucasus. No clinical details are given but the fungus, which proved to be of the black type, is described very fully. A well illustrated article by

For the first of this series see Vol. 31, p. 181

CARRIÓN (A. L.) Chromoblastomycosis. Preliminary Report on a New Clinical Type of the Disease caused by *Hormodendrum compactum*, Nov Sp.—Puerto Rico /& Trop. Med. 1935 June, Vol. 19 No. 4 pp 543-545 With 2 figs on 1 plate [Spanish version pp. 544-548.]

* MACKENZIE (J. E.) Estado del primer caso uruguayo de chromoblastomicosis y revisión crítica sobre la enfermedad. [A Study of the First Uruguayan Case of Chromoblastomycosis and a Critical Review of the Disease].—Arch. Uruguayos de Medicina 1934 Vol. 2 pp. 201-228. With 3 figs. [Summarized in Rev. Applied Mycology 1935 Aug. Vol. 14 Pt. 8, p. 509.]

ROSENTHAL (J. M.) Blastomycosis in an Infant Six Months Old.—J. Lab. & Clin. Med. 1935 Aug. Vol. 20 No. 4 pp. 1164-1165.

* TORRE (Richard) Beitrag zur Pathologie der exotischen Blastomycosen.—Zeitschr. f. Parasitenk. 1935 Sept. 11 Vol. 7 No. 6 pp. 679-744 With 16 figs. [1 page of refs.]

* ILDRIM (D. J.) Madurapilis im Nordkaukasus (U.S.S.R.).—Arch. f. Schiffs- & Trop. Hyg. 1935 Aug. Vol. 39 No. 8 pp. 348-359

BORDJOŠKI and MILOCHEVITCH⁶ deals with a case seen in Northern Jugo-Slavia. The patient was a woman 42 years of age who injured her left foot some 28 years before. There was no obvious lesion at the time but the foot thereafter showed occasional swelling until the dorsum became discoloured and exfoliating two or three years after the accident. The area now bled easily on slight trauma and enlargement of the whole foot became apparent. A small tumour was noticed over the fourth toe when the patient was aged about 20 and some surgical operation was then performed. It is noteworthy that until now the patient had never left her native village. Subsequently small livid, red nodules appeared on the dorsum and some of these broke down to discharge a yellowish white fluid—a few of the consequent sinuses healed. About six years ago small colourless grains were noticed in the discharge whilst pain and swelling increased. When the woman was seen by the authors she was cachectic and the left leg was somewhat atrophied. The foot itself was enlarged and all its joints including the ankle were fixed. The sole was normal in colour but the dorsum was patchily dark grey and red with scattered white scars. There were very many maize-sized nodules. Sinuses discharged a colourless or blood-stained fluid containing pale yellow granules of varying sizes. The left inguinal glands were swollen, adherent and painful whilst radiography demonstrated irregularity and thickening of bone together with destruction and osteoporosis. Injections of an iodide caused local and general reaction of such severity that amputation was ultimately performed at the patient's own request. Minute morphological and cultural details of the fungus are described, but experimental inoculation into rabbits proved unsuccessful. It would seem that the organism is new so that the authors propose to call it *Actinomyces brumpti* n. sp.

Acladiasis and Paraceladiasis—One of the many excellent articles in the special dermatological number of the *Journal of Tropical Medicine and Hygiene* has been written by CASTELLANI and JACONO⁷ on this subject. The disease has been seen in Malay, South America, Siam and Ceylon. In a typical example ulcerations may occur anywhere on the body but are less common on the head, palms and soles. Each ulcer is sharply defined round or oval and its size may be from that of a sixpence to that of a half-crown—it secretes an abundant purulent fluid which dries to form thick yellow ruploid crusts. Removal of these crusts shows the bases of the ulcers to be studded with rather prominent red granulations. Occasionally gumma-like swellings may also be present. The disease is chronic, may be accompanied by slight fever and later gives rise to a secondary anaemia. Treatment consists of large doses of potassium iodide by mouth and mild anti-septic lotions locally. The causative fungus is the *Acladium castellani*. Recently a Chinaman was seen whose disease matched the above description except for the fact that the ulcerations were neither so definite nor so deep. Potassium iodide did not have much effect and Castellani's fuchsin paint proved the most efficient local dressing.

⁶ BORDJOŠKI (M.) & MILOCHEVITCH (S.). Sur un cas de pied de Madura en Yougoslavie produit par une espèce nouvelle d'*Actinomyces*: *Actinomyces brumpti* n. sp.—*Ann Parasit Humaine et Comparée* 1935 Jan. 1 Vol. 13 No. 1 pp. 36-51 With 10 figs. on 2 plates. [11 refs.]

⁷ CASTELLANI (Aldo) & JACONO (Igino). *Acladiasis and Paraceladiasis*.—*J. Trop. Med. & Hyg.* 1934 Dec. 1 Vol. 37 No. 23 pp. 360-363 With 2 plates (1 coloured).

A different fungus was found in this case, *Ascothrix chartariae* Berkeley 1838, var. *orientalis* Castellani and Jacomo 1834. The patient declared that the infection is not rare in Central China (Shensi).

Piedra.—WOLFF and GERLACH⁸ describe a case seen in Batik, Dutch East Indies, a man whose scalp was heavily infected by a fungus which culture proved to be a *Trichosporon*. The disease was rapidly cured by means of several thorough washings with warm soapy water. No other cases were known or could be discovered in the neighbourhood.

Pinta.—There has now been published by Fox⁹ a review of the work carried out in Mexico between the years 1929 and 1931 by the commission appointed under the leadership of UNVERA. The disease is endemic in the southern half of the Republic, where nearly 11 per cent. of the total population of 2,500,000 were found to be affected. Cases of the blue type were 67,380 in number of the white type 57,271 of mixed types 51,731 of lead-coloured type 27,281 together with smaller numbers of violet, black, red and yellow varieties. The mucous membranes were affected in 72,873 of these 270,685 patients, but scaling was present only in 60,000. Constitutional symptoms were very variable and the value of their consideration is regarded as doubtful. The disease is most common between the ages of 30 and 40. No conclusions could be drawn as to the influence of occupation,avitamnosis or the proximity of rivers. The idea of contagion predominated, insect bites being frequently suggested. It is said that the same infection is found in dogs, horses and pigs in some areas. FERNANDO¹⁰ describes the lesions seen in a Malay boy 11 years of age, who had never been out of Ceylon. A small black patch appeared on the right cheek some four years before. This gradually enlarged and became darker until about six months had elapsed when the centre became reddish. Later the patch turned white and new roundish areas with sharp outlines developed below the eyelids and behind the ears. Itching was intense. Prolonged treatment with 3 per cent. resorcin and 2 per cent. salicylic acid in soft paraffin cleared the lesions but did not affect the achromia. The *Aspergillus* cultures are also described.

Tinea imbricata.—The history of this disease is dealt with by CASTELLANI¹¹ who starts from Dampier's description in "A Voyage Round the World," published in 1700. The four species of fungi are discussed and the author claims that at least two species must be admitted, *Endodermophyton tropicalis* and *E. imbricata*. There are four principal clinical types, concentric, diffuse, moulting and mixed. He also describes a very chronic example seen in an Englishman who first contracted the disease in 1916 in Arabia. The fuchsin paint has now almost cured him, all previous applications having failed.

⁸ WOLFF (J. W.) & GERLACH (J. H. A.). Een geval van Piedra.—Geschied. Tropische & Nederl. Indie. 1935 Mar 19 Vol. 75 No. 6 pp. 515-518. English summary (7 lines).

Fox (Howard). A Census of Mal del Prato in Mexico.—Arch. Dermat. & Syph. 1935 Feb. Vol. 31 No. 2 pp. 227-239.

¹⁰ FERNANDO (S. E.). Pinta. Notes on a Case occurring in Ceylon.—J. Trop. Med. & Hyg. 1934 Dec. 1 Vol. 37 No. 23 pp. 375-378. With 2 text figs.

¹¹ CASTELLANI (Aldo). Tinea Imbricata (Tokelau). A Short General Account with Report of a Case in a European.—J. Trop. Med. & Hyg. 1934 Dec. 1 Vol. 37 No. 23 pp. 363-368. With 1 fig & 4 plates (2 coloured). [31 refs.]

Favus.—CATANEI¹² reports his observations of 23 native children seen in the plain of Mitidja, Algeria. Their ages varied from 2 to 13 years and they were all re-examined at odd times from 2 to 7 years after the diagnosis of favus of the scalp had first been made. No treatment of any kind was ever given. Two cases were found to have healed spontaneously within twelve months two within two years one within three years and one within four years. Three other children were seen in whom the disease had almost disappeared. Therefore the infection does often die out spontaneously without leaving any appreciable scarring.

Tinea tonsurans—A scarring ringworm of the scalp *Tinea decalvans persiana* is seen from Ceylon to China. CASTELLANI¹³ describes these cases, which are due to *Trichophyton violaceum* Bodin var *decalvans* Castellani. The scalp shows one or more patches covered with a very large number of heaped up white branny scales. After a time both scales and hair disappear to leave smooth bald patches. These areas remain permanently bald although the actual amount of scarring is not heavy. Microsporon infections of the scalp are very rare in the Mediterranean basin and CATANEI¹⁴ states that only three have been hitherto noted in Algeria since 1906. Recently he has found eight more cases in Algiers two of whom were Europeans one a Jew and the rest natives. In every case the offending organism proved to be *M. felineum*. The same author¹⁵ has been trying to determine the resistance to reinfection by ringworm. The animals used were guinea pigs and the fungus was *Trichophyton asteroides*. He found that when the animal shows local inflammatory reaction to the infection an immunity is produced and this is proved by the difficulty experienced in producing reinfection over fourteen months. Those animals which have been infected and which later react strongly to trichophytine are also immune for long periods. The acquisition of immunity is slow and is never attained before the fungus has actually attacked the hairs. Attempts to produce immunity by injections of trichophytine gave very poor results. Inoculation of the fungus by means other than the skin (e.g. intraperitoneal) also gave rise to very little resistance. It would also seem to be true that some dermatophytes never produce immunity.

Epidermophytosis—When any subject is dealt with by the observer who originally described or discovered the cause of the disease in question the article must prove of great interest. WHITFIELD¹⁶ has contributed such a paper on epidermophytosis, but his remarks are restricted to treatment. It is important to note that he believes cure may be effected in most cases in the absence of affection of the nails. Two other great difficulties present themselves—the fungus may be

¹² CATANEI (A.) Sur la guérison naturelle précoce du favus.—*Bull. Soc. Path. Exot.* 1935 May 8 Vol. 28 No. 5 pp 344-345

¹³ CASTELLANI (Aldo) *Tinea Decalvans Persiana*.—*Jl. Trop. Med. & Hyg.* 1934 Dec. 1 Vol. 37 No. 23 pp 368-369 With 5 figs. on 1 plate

¹⁴ CATANEI (A.) Huit nouvelles observations algériennes de microscopie.—*Arch. Inst. Pasteur d'Algérie* 1935 June. Vol. 13 No. 2. pp 216-218

¹⁵ CATANEI (A.) La résistance aux réinfections dans les tignes (étude expérimentale).—*Arch. Inst. Pasteur d'Algérie* 1935 June. Vol. 13 No. 2. pp. 219-232 With 1 fig & 1 plate.

¹⁶ WHITFIELD (Arthur) Some Notes on the Treatment of Epidermophytos Infection.—*Jl. Trop. Med. & Hyg.* 1934 Dec. 1 Vol. 37 No. 23 pp. 333-335

so deeply embedded in thick horny tissues that the fungicide cannot get at it and there seems to be a stage where very resistant spores are formed. This resting stage may be suspected clinically in patients with exfoliation but no vesiculation. In specimens taken from such a case there may be seen thick-walled, round or oval elements between segments of mycelium or at the end of a strand. In order to avoid infection when in contact with known cases it is important never to walk barefooted and never to borrow socks or slippers, for the disease is spread by bath-mats, Turkish baths, etc. An infected patient should take appropriate precautions to avoid spreading the fungi and should wear special slippers in the bath-room. These have leather soles and bath-towel uppers—they can be sterilized by boiling. The ordinary socks may be protected by wearing thin cotton socks or toe-guards under them. The feet should be dried with "cotton roll" which can be destroyed subsequently. Locally many applications are of value in different cases but on the whole he recommends the following ointment and lotion—

Acid benzole	gr 25	Acid benzole.	dr 1
Acid salicyl.	gr 15	Acid. salicyl.	dr 1
Paraff. mol.	dr 2	Acetone "	oz. 1
Paraff. dur	gr 15	S V DLI ad	oz. 4
Ol. coc. nucis ad	oz. 1		

In chronic cases where there is not much ulceration the following prescriptions are often useful—

Copri nitrat	gr 40	Liq. ferr. perchlor	dr 1
Acid. benzole.	dr 1	Alumina chlorid.	dr 2
Acetone	oz. 1	Acid hydrochlor	
S V DLI	oz. 5	dil.	.. dr 1
Aq. ad	oz. 8	Aq. destill. ad	oz. 4

Treatment of this affection is also dealt with by GARCIA¹⁷ who experimented on the students in the College of Medicine in Manila. He treated 20 cases with formalin and claims 100 per cent. cure where the solution was over 25 per cent. in strength. With a 50 per cent. solution the average number of applications which attained this desirable result was but four. Wright's stain (methyl blue in methyl alcohol) was used in 15 cases. Cure resulted after six applications of the undiluted stain. The author gives no statement as to the period over which the patients were observed after their apparent recovery. He also makes the following astounding statement, "among the physical therapeutic agents X-ray is still the best." [It is true that radiotherapy allays ectematization but it does not kill the fungus. It is surprising how much misapprehension still exists on this score.] PEYRIER and RAYMOND¹⁸ have written in praise of Vieringckx's solution and ointment, each of which contains a mixture of the polysulphides of calcium. Full details are given as to the methods of manufacture of these preparations. In Indo-China these applications have proved their value in all parasitic diseases including those due to fungi. GRÜTZ¹⁹ has written of his experiences in Bonn.

¹⁷ GARCIA (Eusebio Y.) Treatment of Trichophytozo of the Feet by Povidol and Wright Stain.—*Jl. Philippine Islands Med. Assoc.* 1935, May Vol. 15 No. 5 pp 273-276.

¹⁸ PEYRIER & RAYMOND Solution de sulfure de calcium (Wiemhöck) contre les dermatoses parastitaires. Note thérapeutique.—*Bull. Soc. Méd.-Chirurg. Indochine.* 1934, Aug.-Sept. Vol. 12 No. 7 pp. 722-728.

¹⁹ GRÜTZ (O.) Ueber die Epidermophytie.—*Med. Klin.* 1935, Sept. 13. Vol. 31 No. 37 (1935) pp. 1180-1192. With 3 figs. [21 refs.]

He does not believe that transmission in swimming baths is really serious. Certainly his bacteriological investigations in such places have not been very successful in the detection of these fungi. Some 693 cases seen in Buda Pest during the last 15 years have been analysed by BALLAGI²⁰. All were under clinical suspicion and in only 167 was he unable to prove the presence of fungus. There were 41 classical examples sharply defined and having pustules. Interdigital erosions only were seen in 255 and onychomycosis occurred in 87. There were 44 cases of yeast infections, all of which gave positive reactions to levurine. CARRIÓN²¹ reports two cases of infection of the toes in Puerto Rico. Both were due to *E. floccosum* which had never been previously detected. The fungi which had always been found before were *T. rubrum* and *T. gypseum*. A well-illustrated article which gives full mycological details.

The Culture of Fungi—A method of recovering typical cultures from old growths which have become downy and pleomorphic has been very fully described by ACTON & DEY²². This pleomorphism in old laboratory cultures has always been a difficulty in the study of mycology. Therefore the authors first confirmed the results of other workers who used such natural media as leather bones etc. Their experiences decided them to reduce the favourability of the conditions under which the cultures were made. For the preliminary subcultures feathers are mounted on plaster of Paris blocks and put into test tubes containing a little water. Cotton wool plugs are used. The whole is then sterilized in an autoclave at 120°C. Material from pleomorphic cultures is then inoculated on the rachides of the feathers. These subcultures grow well whilst water is still present and at first are of the *dewet* type. Gradually however the growths dry and shrink becoming more and more adherent after the water has dried up. After being kept in the dry tubes for one month specimens are inoculated into different standard media. It is found that the fungi now grow true to type having lost all pleomorphic features. It is suggested that in dry feather culture spores become dominant. Their germination results in true cultures whereas reproduction from mycelium gives rise to pleomorphism. Similar effects have been found with old cultures in Sabouraud's medium cultures which had become dry with age.

Other Fungus Infections—HANSMANN & SCHENKEN²³ report a very curious case in a white middle-aged man. The eruption first appeared behind the knees in 1917 and gradually spread. In 1931 there was a dry scattered, papular itching rash which had one year later spread over the entire body as a mixture of papules scales and ulcers of 3 to 4

²⁰ BALLAGI (Stephan) Ueber Hand und Fußmykosen mit besonderer Berücksichtigung der mykotischen Dyshidrose.—*Med Klin* 1935 Sept. 13 Vol. 31 No. 37 (1904) pp 1204-1205

²¹ CARRIÓN (A. L.) Observations on Dermatophytosis in Puerto Rico. Further Report on the Etiology of Epidemiomycosis.—*Puerto Rico Jl Public Health & Trop Med* 1935 Mar Vol. 10 No. 3 pp 255-261 With 7 plates. [Spanish version pp 263-269]

²² ACTON (H. W.) & DEY (N. C.) A Simple Method of recovering Typical Cultures of Dermatophytes from Pleomorphic Growth.—*Infect Med Gaz* 1934 Nov Vol. 69 No. 11 pp 601-604 With 3 text figs. & 12 figs. (8 coloured) on 2 plates.

²³ HANSMANN (G. H.) & SCHENKEN (J. R.) A Unique Infection in Man caused by a New Yeast like Organism a Pathogenic Member of the Genus Sepedonidium.—*Amer Jl Path* 1934 Nov Vol. 10 No. 6. pp 731-738 With 9 figs. on 4 plates.

cm. diameter. The most recent ulcers were irregular and showed a tendency to confluence—the mucous membrane of the mouth was thickened. The man was very emaciated but all general and pathological examinations were negative except for the results of biopsy. The skin showed a chronic inflammatory process with yeast-like organisms both free in the tissues and phagocytized. Despite all treatment death ensued rapidly. Post-mortem there were fibrotic, fatty or necrotic changes in many organs. The same organisms were found in the lungs, adrenals and lymph glands. Cultures were similar to those of *Oidium gilchristii* but differed therefrom in that the spores were large and spiculated whilst the mycelium was delicate. The organism also proved pathogenic to dogs, rabbits, guinea-pigs and rats. At the moment it is proposed to classify it with the genus *Sphelotrichum*. SARTORY, SARTORY, MEYER & WEISS²¹ have published a paper which deals in detail with a yeast obtained from scales which have been procured from natives suffering from skin disease in French Equatorial Africa. They propose to name the organism *Blastodermion sclerophyli* n. sp. Unfortunately no clinical descriptions are included in this paper.

Verruga.—As it is now proved that verruga and Oroya fever are but different types of the same infection, Fox²² proposes that the entire process be known as Carrasco's disease in honour of the student who lost his life after a voluntary inoculation. The malignant type (Oroya fever) is restricted to certain parts of Peru and gives rise to a profound anaemia more rapidly than does any known condition other than haemorrhage. The benign type differs from all known dermatoses. The skin shows milky papules arising on tiny petechial spots; these papules gradually increase in size and eventually the older lesions become pedunculated. The eruption may occur anywhere on the body but it tends to attack the extensor surfaces of the limbs more severely and to leave the palms and soles free. Sometimes a few hard subcutaneous nodules are seen and the mucous membranes may be affected. The causative organism is *Bartonella bacilliformis*. Infection with one type of the disease produces immunity to the other type. The insect vector (a species of phlebotomus) has been discovered and the existence of a plant reservoir is possible. No specific treatment is known.

Epidemic Dropsy—Cutaneous manifestations were very prevalent in the 1934 outbreak in Bengal and its adjacent States. CHOPRA & CHAUDHURI²³ report 15 such examples out of 39 cases. Of these, 9 showed an intense erythema almost purple in colour over the extremities and abdomen. "Sarcoids" were seen in 4 patients. These were sessile, pedunculated, ulcerated or fungating when fully developed, but they start as minute red papules which gradually enlarge and become vascular. The largest seen measured $1\frac{1}{2}$ inches in diameter. One case showed erythema and "sarcoids," whilst another suffered from erythema together with pigmentation of the face, hands and feet.

²¹ SARTORY (A.), SARTORY (R.), MEYER (J.) & WEISS (R.). Etude d'un chrysoplasma levigiforme nouveau nom d'une dermatomycose tropicale—*Bull. Acad. Med.* 1935 Apr. 16. 98th Year. 3rd Ser. Vol. 111. No. 15. pp. 486-488.

²² FOX (Howard). Verruga Peruviana (Carrasco's Disease) based on Personal Experience in Peru.—*Jl Amer. Med. Assoc.* 1935. Mar. 23. Vol. 104. No. 12. pp. 965-966 With 6 figs. [31 refs.]

²³ CHOPRA (R. N.) & CHAUDHURI (R. N.). Cutaneous Manifestations of Epidemic Dropsy Part I. A Clinical Study.—*Indian Med. Gaz.* 1935. Sept. Vol. 70. No. 9. pp. 483-496. With 4 coloured plates.

The same authors together with PANJA²⁷ have also studied the histology of the above signs. The chief changes occur in the blood vessels these are dilated and surrounded by proliferated endothelial cells. Sometimes there is formation of new capillaries which give rise to the sarcoids. Experimental cultures and inoculations into volunteers and monkeys all gave negative results [It is a pity that the term 'sarcoids' has been used to describe the lesions which are essentially haemangiomatous in structure.]

Animal Parasites—BOYD and RIVIERE²⁸ report a curious rash from French Guiana. It consisted of a "run" 1½ cm. in length on the left cheek the older part of which showed serous scabs whilst the advancing point surmounted fine vesicles. An acarus was extracted and proved to be a male *Tarsonemus* but the source of the infection remained obscure despite all investigations. The greater part of the article describes the microscopical appearances of the mite in great detail. A very severe case of Norwegian scabies is described by FIALHO²⁹ the subject being the emaciated corpse of an old woman who had died of tuberculosis in a hospital in France. The clinical appearances were severe but typical. Excellent microphotographs help to support the author's contention that this acarus is indistinguishable from the *Acarus scabiei*. That mites affect poultry and many wild birds is well-known but it has been left to LAWRENCE³⁰ to describe a series of cases of human infection. These occurred in Australia and the skin changes were characteristic of parasitic infections. These mites (*Dermatophyssus avium et gallinae*) also live on sparrows, starlings and pigeons whose abandoned nests they may leave to invade a house. The same paper also deals with trichomes (i.e. minute hairs, scales etc. from plants) and in particular with those shed from the plane trees of Melbourne. These spicules become caught in the material of underwear, shirt collars, etc. when they can cause itching eruptions which look however as though they were due to external irritation. CAWSTON³¹ deals with Creeping eruption as seen on the Natal coast where sand larvae are common within ten feet of the edge of water in the mangrove marshes. They concentrate on wet banks in depressions and ditches, whilst their development is favoured by humidity and decaying leaves. The *Ancylostoma brasiliense* is the known cause and is a common hook worm of domestic pets in Natal. The movements of the larvae cause little discomfort but severe irritation is felt at the end of the tunnel where there is an intense inflammatory reaction after the larva has passed farther on. Good results are obtained by freezing with carbon

²⁷ CHOPRA (R. N.), CHAUDHURI (K. N.) & PANJA (D.) Cutaneous Manifestations of Epidemic Dropsy Part II A Histopathological Study—Indian Med. Gaz. 1935 Sept. Vol. 70 No. 9 pp 496-498. With 11 figs. on 2 plates.

²⁸ BOYD (R.) & RIVIERE (M.) Un cas de dermatose accidentelle du type sarcopique, provoquée par un *Tarsonemus*—Bull. Soc. Path. Exot. 1934 Oct. 10 Vol. 27 No. 8 pp 759-762. With 1 fig.

²⁹ FIALHO (Amadeo) Sur un cas de gale norvégienne—Ann. Parasit. Humaine et Comparée 1934 Nov. 1 Vol. 12 No. 8 pp 473-481. With 1 text fig & 10 figs. on 5 plates.

³⁰ LAWRENCE (Herman) The Pathogenicity of *Dermatophyssus avium et gallinae* and of Trichomes in the Human Being—Med. J. Australia. 1935 July 6 22nd Year Vol. 2 No. 1 pp 16-20. With 6 figs.

³¹ CAWSTON (F. G.) Creeping Eruption at the Natal Coast.—Jl. Trop. Med. & Hyg. 1934 Dec. 1 Vol. 37 No. 23 pp 374-375

dioxide snow or by soaking lint in ethyl acetate and afterwards covering this dressing with an impervious material.

Dermatitis venenata—In the Northern Argentine a disease has been known for a long time under the local name of "el pájaro". Di Lullo²² has now dispensed the legends attaching to the eruption and proved it to be due to contact with a tree known as the "coloured quebracho" a member of the *Anacardiacaceae* whose scientific name is *Schizolobium lorentzii*. The typical eruption consists of reddish macules surrounded by hardish papules and a few vesicles which sometimes become pustulent. There is some diffuse painful oedema accompanied by slight temperature malaise anorexia and headaches. There is also painful enlargement of the glands draining the affected area—they never suppurate however. The rash has been reproduced experimentally by rubbing the skin with leaves flower fruit, alcoholic extract of leaves and by using the distillate obtained after boiling them with water.

Xeroderma pigmentosum.—Two examples in the same family are described by BILISARIO²³. The skin changes were characteristic in the brother and sister aged 8 and 14 years respectively. In both the disease started in infancy and in both there appeared partial loss of function of the left hand early in childhood. The wrist is flexed to a right angle and there is loss of use and control of the fingers, but no sensory changes are apparent. Pathological investigations were negative.

Keratoma plantare sulcatum.—A description of this disease as seen in Dutch Guiana is given by AARS²⁴. During the rainy season the thickened horny layer of the soles develops numerous holes of different sizes and depths. Furrows may appear later but all these lesions never spread deeper than the horny layer. Accumulated dirt then makes these depressions stand out against the yellowish skin with marked clarity. The changes start early in life and are probably non-follicular forms of primary hyperkeratosis. No evidence has been found to support the contention that it may be due to yaws, syphilis or any mycotic infection.

Prickly heat—BOULXON²⁵ writes about the four skin diseases which are particularly prevalent in the humid climate of Bengal. Epidermophytosis, Coxs itch (see ACTON and McGUIRE, this *Bulletin* 1935, Vol. 28 p. 682) furunculosis and prickly heat are dealt with. In the last condition the author is successful with the following treatment. After a thorough bathing and scrubbing there is applied a lotion which consists of 1 to 40 per cent. formalin and 0.5 per cent. menthol in 70 per cent. alcohol or eau de Cologne. The lotion may be dabbed on three or four times a day.

²² Di LULLO (Orestes). "El pájaro. Une nouvelle dermatite rédorative." *Sur-Sud-Américaine de Med. et de Chirurg.* Paris. 1934 Sept. Vol. 3 No. 9 pp. 513-523.

²³ BILISARIO (John C.). Two Cases of Xeroderma Pigmentosum occurring in the Same Family.—*Med. J. Australia*. 1935 Aug 3 22nd Year Vol. 2 No. 8 pp. 143-150 With 6 figs.

²⁴ AARS (Charles G.). Keratoma Plantare Sulcatum (Castilian).—*J. Trop. Med. & Hyg.* 1934 Dec. 1 Vol. 37 No. 23 pp. 373-375 With 1 fig.

²⁵ BOULXON (J.). A propos de quatre affections de la peau connues à l'Européen et à l'Indigène dans les pays tropicaux à气候 humide et en particulier le Bengale.—*Rev. Afr. et Hys. Trop.* 1935 July-Aug Vol. 27 No. 4 pp. 202-213 With 1 fig.

Influence of Climate—The effects of climate on surgical skin conditions in Egypt are dealt with by KNIPFER.³⁴ In particular he considers the electrical and hygrometric conditions and finds that boils, whitlows, abscesses and adenitis show a greater incidence during August and September the months when the absolute humidity is at its greatest. LAWRENCE³⁷ has studied the same subject in Australia but has paid special attention to keratoses, rodent ulcers and epitheliomata. These are all far more common in Australia than they are in the British Isles or the United States. The sun's rays and low humidity both play a part. Pigment undoubtedly protects the skin as these growths are never seen in the aborigines.

M. Sydney Thomson

³⁴ KNIPFER (A.) Relation of Electrical and Hygrometric Conditions of the Atmosphere to Surgical Skin Infections in Egypt.—*Jl Trop Med & Hyg* 1935 May 15 Vol. 38 No. 10 pp 123-128 With 1 chart. [75 refs.]

³⁷ LAWRENCE (Herman) The Incidence of Skin Conditions in Australia.—*Brit Med Jl* 1933 Sept. 28. pp 572-575 With 2 figs. (maps)

MISCELLANEOUS

SALAH (M.) Studies on Anaemia in Egypt. I.—Methods of Investigation. II.—Helminthic Anaemias. III.—Treatment and Mechanism of Helminthic Anaemia. IV.—Rarity of Addison's Anaemia in Egyptians.—*Jl. Egyptian Med. Assoc.* 1935, July Vol. 18, No. 7, pp. 425–437 [With 1 fig. 433–434 435–471 [24 refs.] 473–482 With 1 fig. [19 refs.]

These lectures by Dr. Salah form an important contribution to the study of tropical anaemias and in consequence those who are interested in the subject would be well advised to read for themselves this special number of the Journal of the Egyptian Medical Association.

I. Methods of Investigation.

In his introductory remarks Dr. Salah points out that considering the low diet of the poorer classes and the gastro-intestinal pathology resulting from alimentary parasites, it is only natural that anaemia should prove a prevalent ailment in Egypt. Such anaemias may arise from three factors—blood destruction, blood loss and deficient blood formation—and for their complete elucidation investigations should include a clinical examination, a haematological investigation and a search for parasites and their ova as well as special gastro-intestinal tests.

The clinical examination.—Apart from the history and the examination of the different systems there should be a routine inspection of the skin, sclera, mouth, nails and thyroid gland. Spoon nails, for example, are diagnostic of hypochromic anaemia, while clubbing suggests tuberculosis, chronic sepsis etc. Glossitis is associated with both Addison's anaemia and idiopathic hypochromic anaemia and the Plummer-Vinson syndrome—bleeding gums may result from aplastic anaemia, haemorrhagic diathesis or scurvy while stomatitis and pharyngitis terminating in necrosis of tissue may be the only manifestation of aplastic anaemia or agranulocytosis. A pigmented line in the gum is always suggestive of lead or bismuth poisoning.

Haematological examination.—The author states that an examination of a blood film stained with Jenner's stain and a haemoglobin estimation by Sahli's method should be included as a routine measure in the examination of all patients in Egypt. If more detailed haematological studies be required, as suggested by the clinical findings, 1 cc. of blood is drawn from a vein without the application of a tourniquet and put into a dry oxalated test tube such a sample gives quite accurate results provided the different examinations be made within half an hour of its collection. Additional examinations include the red cell and leucocyte counts, the colour index, the differential and platelet counts and, in special cases, the van den Bergh reaction, sternal puncture and the determination of the size of the red blood corpuscle—the latter can be accomplished by—(i) measuring the diameter of the erythrocyte by direct or indirect micrometry or by the halometer—the latter method, however, has not, in the author's experience, yielded reliable results and Price-Jones curves are advocated. (ii) measuring the volume of the red cell by Haden's method. Sternal puncture is a simple technical procedure and in certain cases has afforded the only clue to diagnosis. For the actual technique the reader is referred to a previous publication.

Special Gastro-Intestinal Investigations.—These include gastric analysis using the alcohol-histamine method, the glucose tolerance test,

chemical analysis of the stools for steatorrhoea and occult blood, and sigmoidoscopy. The stools should always be examined for parasitic ova and in some infections such as *S. mansoni*, *Taenia* and *Heterophyes* repeated tests often prove to be necessary. A positive cutaneous reaction in the absence of ova suggests cured or closed bilharziasts.

II.—*Helminthic Anaemias*

A total of 762 cases of helminthic anaemia was studied applying the methods of investigation epitomized in the preceding review. The main parasitic causes of severe anaemia were *Ancylostoma duodenale* and *Schistosoma mansoni*. Urinary schistosomiasis was a cause of moderate anaemia especially if associated with haematuria or urinary sepsis while infection with *Heterophyes heterophyes*, *Hymenolepis nana*, *Taenia saginata* and *Filaria bancrofti* were only associated with a mild degree of anaemia or normal blood counts.

Red Blood Corpuscles—Marked hypochromia was a constant feature of the severer cases a haemoglobin value of from 15 to 20 per cent. being common. In two cases it was as low as 8 per cent. The number of r.b.c. was only moderately decreased so that the colour index was low it averaged 0.6 for the series the highest value being 0.8 and the lowest 0.4. Microcytosis was common especially in severe chronic anaemia while in moderate cases normocytosis was usually found the average corpuscular diameter was 6.85 microns the highest being 7.4 and the lowest 6.1 microns. Macrocytosis was never found. The Price-Jones curve showed a shift to the left in the chronic cases and a wide base in the normocytic group. Polikilocytosis was frequent reticulocytosis was not marked and nucleated corpuscles were confined to heavily infected ancylostome cases of short duration when present they consisted of normoblasts and occasionally macro-normoblasts but never megaloblasts. The presence of a high reticulocyte count suggested some complicating factor such as haemorrhage, malaria, etc.

Leucocytes—a tendency to leucocytosis (11 000–12 000 per cmm.) was met with in acute ancylostome anaemia and in cases associated with pellagra. Chronic uncomplicated ancylostome anaemia showed a normal or slightly diminished total count while in the anaemia of intestinal schistosomiasis there was a tendency to leucopenia especially if hepato-splenomegaly had supervened figures as low as 1 500 cells per cmm. were encountered.

The percentage of eosinophiles depended on the stage of the disease and the constitution of the patient rather than on the intensity of infection eosinophilia was most marked in the early stages where it reached 70 to 75 per cent. in acute ancylostome cases it was higher in people with higher haemoglobin values. Cases showing marked eosinophilia recovered quicker on treatment while in severe infections those with a mild eosinophilia or none at all did not do well this is only true however if other signs of marrow failure are present and if infective or septic conditions are absent. An eosinophilic rise affords an index to effective therapy just as reticulocytosis does to haematinic agents.

The neutrophils were generally diminished but a regenerative shift to the left with the Schilling's haemogram was only noted in acute cases of ancylostome anaemia associated with leucocytosis.

In very chronic cases relative lymphocytosis accompanying neutropenia was sometimes found, but monocytosis always suggested malaria (2007)

Blood Platelets — The platelet count was slightly diminished, averaging 175,000 per cmm.

Blood Chemistry — The icterus-index was always within normal limits indicating an absence of haemolysis as a causative factor in the anaemia. The total protein estimated by Howe's method, was not uncommonly reduced, but there was no increase in urea, uric acid or non protein nitrogen. The whole-blood cholesterol was constantly decreased such low figures as 57 mgm. per 100 cc. being found. Hypocholesterolaemia under these circumstances is attributable to loss of red cells and haemoglobin and is not characteristic of any special type of anaemia. It is more parallel to the haemoglobin reduction than to the orthocytopenia. The chloride content of the whole blood was increased in most cases, while the calcium content of the serum was variable no relationship was found between the degree of eosinophilia and the serum calcium.

Clinical Manifestations — Investigation showed that intestinal worms, especially ancylostomes and schistosomes, could produce disturbances of gastric secretion, only 158 out of 564 cases showing normal curve, while a return toward normal was observed after expulsion of the worms in the 92 cases studied from this viewpoint. These gastric disturbances might or might not produce symptoms. The hyperchlorhydric group sometimes gave rise to a clinical picture simulating duodenal ulcer while the hypochlorhydric and achlorhydric group usually lead to anorexia and sometimes to gastrogenous diarrhoea. The frequency of stools of gastric origin suggested gastritis as a basic factor underlying these disturbances.

Oedema — the occurrence of oedema in helminthic infections was not uncommon and 22 such cases were subjected to clinical and biochemical studies. All patients showing oedema were markedly anaemic, yet there was no relationship between the occurrence of oedema and the degree of anaemia. The absence of marked albuminuria, the normal blood urea, the absence of high blood pressure and the low blood cholesterol were definitely against either a nephritic or nephrotic factor being responsible for the oedema. Hypoproteinuria was found in 11 out of 15 cases and the fact that this was the main factor in the production of the oedema was proved by its disappearance within 10 to 15 days on protein reinforcement of the dietary, and this in the absence of all other forms of treatment.

Glossitis and Stomatitis — Glossitis occurred to some degree in 1 per cent. of patients suffering from helminthic anaemia. It was more frequent in those showing anæcidity but might occasionally be found associated with hyperchlorhydria. Not uncommonly it was encountered in intestinal bilharziasis.

Dysphagia — about 1 per cent. manifested painless upper oesophageal dysphagia, this feature being invariably accompanied by stomatitis. Achlorhydria was found in 4 out of 8 cases and in two of these splenomegaly occurred (Plummer Vinson syndrome).

Halluxychia — Spoon shaped nails were met with in 22 cases, i.e. about 2.5 per cent. and were mostly associated with ancylostomiasis; twelve were achlorhydric and 5 were hypochlorhydric. Convexity of the nails up to marked clubbing was encountered in certain cases of bilharzial dysentery.

Nervous manifestations — eighteen cases with nervous symptoms mainly due to tract lesions were observed. Of these, 14 were tractible

to associated pellagra in the remaining four signs of lateral sclerosis were demonstrated in two and of subacute-combined-degeneration in the other two.

Finally the author summarizes this important study by stating that the diagnostic points in the blood picture associated with helminthic infestation are those of a marked hypochromic, micro-normocytic non haemolytic, hypoplastic anaemia with eosinophilia.

III.—Treatment and Mechanism of Helminthic Anaemia

Complete expulsion of parasites did not result in improvement in the anaemia of 27 patients kept in hospital upon a low protein diet there was an increase of only 4 per cent in haemoglobin in 3 to 4 weeks and an average gain in red cells not exceeding 500 000 per cmm within the same period. When placed on a well balanced diet with sufficient protein the average rise of haemoglobin in 47 patients after antihelminthic treatment was 3 per cent.

Liver Therapy three hundred grams of raw liver by the mouth for 2 to 4 weeks daily did not produce any notable increase in the haemoglobin percentage in 33 cases there was no specific reticulocyte response and only in a few was there an increase in erythrocytes to the extent of 500 000 per cmm. Campolon injections were similarly ineffective. Eosinophilia commonly follows the administration of liver extract in megalocytic anaemia, but this was never observed in the present series. On the other hand, an eosinophile increase followed iron therapy—a finding which suggests that the eosinophilia originates from stimulation of the bone marrow rather than in an allergic state.

Iron therapy iron in large doses elicited a prompt improvement in the blood picture ferrous iron as Blaud's pills (3 to 4 t.d.s.) and *Ferrum ammonii citras* (1½ to 2 grams t.d.s.) proving most efficacious in the absence of complicating factors interfering with its utilization and absorption.

Iron was found to be more effective in ancylostoma anaemia than in intestinal bilharziasis owing to the more marked and persistent gastro-intestinal lesions in the former disease. MINOT and HEATH had found that the lower the initial color index the higher the reticulocyte crises in hypochromic anaemia under iron therapy. In the present study this finding was confirmed, but it was also ascertained that the reticulocyte response was greater where the initial figures for both reticulocytes and eosinophiles were higher. The reticulocyte curve following iron therapy in the presence of parasites proved lower more delayed and flatter with occasional fluctuations than when iron was administered after their expulsion while in some cases it was found that a further rise in haemoglobin occurred after the infection was eradicated. These findings suggest that the mere presence of the worms interferes to a certain extent with the utilization of iron *per os*—possibly through the formation of a toxin. Other modifying actions such as defective secretion of HCl diarrhoea, sepsis hypothyroidism and arteriosclerosis are considered in relation to the therapeutic effectiveness of iron.

After parasites had been eliminated and iron given the haemoglobin rose to 60 to 75 per cent, but subsequently no further rise was observed during the period of observation extending over 10 to 15 days.

In helminthic anaemia injections of iron using the British Pharma copoecial preparation (*injectio ferrri*) proved incapable of raising the count.

haemoglobin more than 10 per cent. in 3 weeks and copper and arsenic were likewise ineffective.

Preparations like marmite and vitamin C had no effect on the reticulocyte response or haemoglobin values, a finding which was expected in view of the micro-normocytic nature of the anaemia.

The mechanism of the production of helminthic anaemia was not considered and such factors as haemorrhage which might lead to loss of iron depletion of haematopoietic hormone or exhaustion of the bone marrow were analysed, as well as the rôle of helminthic toxin, diet and gastro-intestinal factors. Though the ancylostome is a blood sucker and occult blood is readily demonstrated in the faeces of cases of ancylostomiasis, the number of worms expelled after treatment was not proportionate to the degree of anaemia. Similarly in certain bilharziases where the blood loss is considerably greater than the intestinal variety the anaemia was in point of fact less intense.

Achlorhydria was found to be commonly associated with helminthic anaemia and the author concludes that, though blood loss and possibly toxins may be contributory factors the essential and more important mechanism is nutritional deficiency resulting from deficient diet and gastro-intestinal dysfunction. The deficiency is mainly in iron although other substances such as lecithin, protein etc., are possibly also implicated. Treatment should be directed to supplying iron in large doses and also fats and proteins to help in the construction of the haemoglobin molecule.

IV — Rarity of Addisonian Anaemia in Egypt.

In a series of 1123 hospital cases with anaemia not a single instance of Addisonian anaemia was encountered. After reviewing recent advances in knowledge concerning the production of pernicious anaemia in terms of extrinsic, intrinsic and haematopoietic factors the author considers the various conditions which may be responsible for its absence in Egypt. Race is known to exert an influence as illustrated by the low frequency of Addisonian anaemia amongst Italians, Russians, Jews and North American negroes. Again a constitutional tendency is marked as Friedländer showed since the disease mainly occurred in individuals with fair complexions light hair blue eyes and achlorhydria. A familial incidence was quite common and relatives of patients suffering from pernicious anaemia often themselves presented constitutional achylia which was a predisposing factor. Constitutional achylia was not encountered in a series of 187 healthy Egyptian children under 10 years of age whereas acquired achylia secondary to helminthic anaemia, gastritis and pellagra frequently occurred, but never with Addisonian anaemia, a finding which suggested that an intrinsic factor must be present despite the achylia. Using Singer's method for demonstrating the intrinsic factor in gastric juice the author showed this to be the case a positive R.R.R. reaction in white rats was obtained in 5 chronic pellagra patients and 2 cases of helminthic anaemia. Climate also might be responsible. Thus, Addisonian anaemia was known to be common in temperate zones and rare in tropical countries. Was it possible that the sun's rays by increasing skin pigmentation produced a constitutional condition unsuitable for the development of this disease?

The author concludes that racial and constitutional factors probably underlie the extreme rarity of Addisonian anaemia in Egypt.

N. Hamilton Fairley

SALAH (M.) The Types of Splenomegaly in Egypt and their Diagnosis.—*Jl. Egyptian Med Assoc* 1935 Apr Vol. 18 No 4 pp. 255-266.

The author's account of splenomegaly in Egypt [which is not the same as Egyptian splenomegaly] is comprehensive but from the point of view of diagnosis in life savours rather of the academic than the practical. His classification is on pathological lines and rightly so but, though it includes every known lesion is too subdivided for practical purposes.

The causes as a basis for diagnosis are divided into 5 groups with subdivisions viz. I Simple Hypertrophy II Lymphoid Tissue lesions including lymphocytic leukaemia, lymphosarcoma and fibro-adenia. III Reticulo-endotheliosis subdivided into 3 main types with several subtypes. IV Vascular lesions Fibro-siderosis thrombophlebitic congestive and angiomatous. V Hepatobilienal diseases with more than a dozen subdivisions. The last is the author states

the most vague and unfortunately the most common in Egypt. He divides these into two main groups, according as the spleen or liver is primarily enlarged. It rather adds to the confusion to include for example hydatid of liver since this is not associated with enlarged spleen unless a similar condition affects the latter and Gaucher's disease which has not yet been recorded in Egypt.

The endemic splenomegaly of Egypt belongs to Group V and is primarily a liver disease of bilharzial cirrhotic (mostly hypertrophic) nature, the splenic enlargement is one of its frequent manifestations. Analysis of 500 cases has led the author to the following conclusions:

(1) In no case of Egyptian splenomegaly confirmed was the liver free from disease. (2) Many more cases of bilharzial liver disease are met with without enlarged spleens. (3) In every case of splenomegaly without evidence of liver implications a cause for this condition other than bilharziasis could be elicited. H H S

MENON (T. Bhaskara) & ANNAMALAI (D. R.) The Incidence of Hepatic Cirrhosis in South India.—*Indian Jl. Med Res* 1935 Apr Vol. 22 No 4 pp 827-835 [10 refs.]

The authors analyse mortality returns and hospital admissions in Madras and show that the incidence of hepatic cirrhosis is much higher than in Europe that it has no special association with alcoholism and that the portal type is the most common. They suggest that there is a special association between portal cirrhosis and bacillary dysentery.

Figures are quoted to show that the incidence of hepatic cirrhosis is high in Bengal (ROGERS this *Bulletin* 1925 Vol. 22, pp. 957-61) and in Java (SNIJders *et al.* 1934 Vol. 31 p. 330). The authors have analysed the Annual Report of the Health Officer of the Corporation of Madras the hospital admission register and post-mortem figures. A table gives the annual figures of the Report as regards cirrhosis for 1923-1932 and shows that the average mortality per 100,000 in that period was 82.6 whereas that of England and Wales in a similar series of years was 4.7 showing that judging from mortality figures this disease is 7 times as common in Madras.

The register of admissions to the Government Rayapuram Hospital Madras shows 183 cases of cirrhosis in the last 3 years out of 30,817 men.

All but 8 were of the portal type. Of the 177 92 per cent. were Hindus but 77 per cent. of the total admissions were of this race.

A study of the sex distribution shows that only 43 were in women. The greatest frequency is between 30 and 50 years.

From autopsy figures for Madras we get 4.39 per cent. cirrhosis in 1115 autopsies, a slightly lower figure than that of Rogers for Bengal.

As to causation there is no special relation to alcoholism.

"One of us (B.M.) carried out an analysis of autopsy records in the Madras Medical College, while working in the pathology department in 1928. The results which are now published for the first time show that out of 119 cases of portal cirrhosis 45 showed definite inflammatory lesions in the large intestine. These lesions could be classified into old pigmented scars, small haemorrhagic ulcers, superficial ulceration with extensive congestion, extensive superficial ulceration involving long tracts of mucosa, large deep ulcers with necrotic base, etc. Out of these 119 cases, the intestines were not examined in three cases, so that the percentage works out as 38.87 of hepatic cirrhosis, showing dysenteric lesions. Out of these 45 cases showing dysenteric lesions, in 32 cases the lesions resembled those met with in acute and subacute bacillary dysentery. They were either superficial ulcers with extreme congestion, capillary haemorrhages or small follicular ulcers surrounded by zones of congestion or extensive superficial ulceration involving long tracts of mucosa. The remaining 13 cases showed frank amoebic ulceration or healed pigmented scars. A comparison of these figures with the proportion of dysenteric lesions, met with in hospital autopsies in general, is of interest. Out of 363 recent autopsies in the Government Rayapetra Hospital, Madras, dysenteric lesions were found in 59 cases or 16.30 per cent. It seems therefore, that there is some evidence for a positive association between dysenteric lesions in the intestines and portal cirrhosis."

Three cases of capillary cirrhosis were associated with malana.

A G Begum.

McGREGOR (Christie). Ulcers in the Tea-Gardens.—16 pp. With 15 plates [12 refs.] 1934 Calcutta. Published by the India Tea Association.

The object of this research into the aetiology and treatment of ulcers in tea-gardens was to introduce a standard treatment. The author has been 9 years at the study first at the Calcutta School of Tropical Medicine and then in the Dooms.

He classifies the ulcers thus—

1. *Tropical Phagedenic Ulcer* due to the fusiform bacillus of Piat.
2. *Actinomycotic ulcers*, due to *actinomyces keratolytica* (Acton and McGregor) which I shall describe under the heading of *Actinomycotic Ulcers* see the Bulletin, 1930 Vol. 27 p. 523 1932, Vol. 29, p. 227.
3. *Hookworm ulcers*, due to the entrance of hookworm larvae into the skin, a condition first reported by Bentley (1902).
4. *Streptococcal and staphylococcal ulcers* producing the lesions *Impetigo* and *Ecthyma*.

Tropical phagedenic ulcer—Acros and Panja showed that this ulcer "is caused by the fusiform bacillus, the spirochaete being a secondary invader. The author has found this bacillus in the 2,000 cases he has examined they form a dense felted layer beneath the slough, which secures the needful anaerobiosis. In treatment the

slough must be removed and for this a soluble caustic is needed. The best is copper sulphate His formula is —

R/Copper sulphate	3 drachms
Acid carbolic	1 drachm
Distilled water	1 ounce

The copper sulphate must first be powdered in a mortar and thoroughly mixed with the distilled water until every bit of the copper sulphate has gone into solution. There must be no deposit. The carbolic acid is then added. As the carbolic acid rises to the top of the solution when it is left standing it must be shaken before use on each case so as to mix the carbolic with the copper sulphate. This is very necessary as the solution is then rendered practically painless and the ulcer can now be swabbed thoroughly.

The ulcer is swabbed twice daily with the solution and as much slough as possible removed. A powder of iodoform 1 part and bismuth subgallate 3 parts is then dusted over the ulcer which is covered with a piece of dry lint and bandaged. If iodoform causes a skin eruption calomel is substituted and bismuth subnitrate may be used in the place of the subgallate. This treatment leads to cure in about 14 days and the labourer can resume work after 7. He finds that trama followed by impetigo plays an important part in the spread of these ulcers and advises the application of Ung Hydrarg Ammon (gr x to 3*i*) to any cut or abrasion. The infective organism is almost certainly spread by the fly *Siphonella funicola*.

Actinomycosis cutis —This condition described by ACTON and the author is limited to the skin and does not invade the deeper tissues nor produce granules. It corresponds to Ulcus interdigitale and Keratoma plantare sulcatum of CASTELLANI and the lesions are usually found between the toes and on the soles. They are known in the tea gardens as pani ghao (water sore).

Actinomycosis cutis interdigitalis occurs with the first onset of the rams and is seen in Ceylon and the Philippines as well as India. The causative agent *Actinomyces keratolytica* can only be seen by a special technique of staining which is described. The colouring agent is Toluidin blue which stains mycelia without staining keratin. The ulcer produced is very painful. The treatment which is almost specific consists in painting the lesions with a 2 per cent. solution of gentian violet in distilled water. Crowds flock round the dispensary clamouring for this treatment.

Actinomycosis cutis plantaris is a pitted condition of the heel and tread of the foot. It is very painful and is caused by the same fungus. The treatment which again is specific consists in painting 20 per cent. formalin on the soles once a day.

Hookworm ulcers —These also are known as pani-ghao. The author says that one can see linear track marks showing the entrance of hook worm larvae. The labourers do not come for treatment till the vesicles have become infected. The vesicles are usually seen on the sides of the feet and instep. In the early stage application of 2 per cent. gentian violet is effective. If an inflammatory condition or ulcers are present hint soaked in acriflavine applied 3 times daily is advised.

Impetigo and ecthyma —For these conditions which are prevalent among the European staff the author advises Ung hydrarg ammon. in uncomplicated cases and acriflavine lotion when the lesions are eczematous.

HOUSSIAU (F) & DU SOUZI (G). Des plaies infectées chez les ouvriers aux mines de Kilo. Du phagedénisme vrai et faux. [True and False Phagedenic Ulcer in the Black Miners of Kilo.]—*Ann. de Belgique de Med. Trop.* 1935, Mar 31, Vol. 15, No. 1, pp. 85-93. With 11 figs.

The true phagedenic or tropical ulcer is regarded as an ulcer due to the association of the fusiform bacillus with the spirillum of Vincent. In the region of Kilo, however, this association was rather rare and the ulcers, even of phagedenic type, contained a very varied microbic flora, in which the fuso-spirillar association was absent. Such ulcers have then to be designated "false phagedenic ulcers." Staphylococci predominate among the organisms found and streptococci are rare. No anaerobic cultivation was done and nothing can therefore be said of anaerobes. In the view of the authors the "true phagedenic ulcer is secondary to an infection produced by other organisms. They have used a number of different vaccines in the treatment of the ulcers and have come finally to one composed of 24 strains of isolated organisms plus fuso-spirillar ulcer material. This has been treated with iodine and with formal and the mixture is regarded as containing "antitoxin." The results have been decidedly successful and the time to healing much reduced—only a few ulcers have failed to clear up under the treatment. The importance of saving of unemployed time for a worker in the mines is very evident.

W. F. Harry.

I DE LANGEN (C. D.) Clinical Arteriosclerosis in Java.—*Med. Dienst d. Koloniallande in Nederl. Indië*, 1935, Vol. 4, No. 1, pp. 1-8.

II MÖLLER (H.) & FOSSEK (A.) Die Altersveränderungen der Arterien bei Malaien und an Java lebenden Chinesen.—*Ibid.* pp. 9-20. With 7 figs. on 2 plates. (20 refs.)

I. The author gives the following "conclusions and deductions"—

1. Arteriosclerotic vascular changes are at least as common in Java as in Europe. If the relative age-grouping of the patients is taken into consideration, the impression is gained that these vascular changes are even more common here.

2. Amongst the Javanese people of lower class, the clinical picture of angina pectoris is not met with, but it is seen much more often amongst those of better standing. The same is observed amongst the Chinese patients but not quite so clearly. And yet sclerotic changes in the coronary vessels are very common in our native hospital patients.

3. The occurrence of hypertension as a clinical picture parallels angina pectoris. Here, too, is found the paradox of much arteriosclerosis and but little hypertension among the great masses of the people, a relationship which changes with natives of better standing.

4. Hemiplegia is very common here but syphilis is the pre-dominating cause.

5. Thrombosis and emboli practically never occur.

6. Thrombo-angiitis obliterans is regularly met with in the Netherlands Indies."

These conclusions may be supplemented. The author draws attention to the difficulties of the investigation e.g. persons with severe vascular changes may have no symptoms and therefore not come under observation. The average age of the patients was much lower than that in European hospitals and the number of old persons small. Of patients seen in the author's department 83 per cent. were between 15 and 45, 9 per cent. between 45 and 65 and only 3 per cent. above 65.

Under the heading general sclerotic changes in the vessels the author notes in the younger age-groups that the radial brachial or femoral arteries were frequently markedly tortuous not having hard or tense walls but being soft and relaxed and the blood pressure low rather than high. Under sclerosis of the coronary vessels he notes that whereas in 5 years hospital practice only one native patient was treated in the wards in his own practice (regents native doctors etc.) there were 12 cases of angina pectoris. He discusses the reason of the rarity of thrombosis and embolism in Javans and is inclined to attribute it to the vegetarian diet and a lowered irritability of the vegetative nervous system. The current belief that diet and especially the lipid and cholesterol content is responsible for arteriosclerosis which consequently spares the natives he contests he rather inclines to the view that a diet poor in fats may lead to nutritional disturbances in the vessel walls and a loss of normal elasticity.

Lastly he reports data collected by Dr KOUWENAAR in Medan Careful observations were made of the sclerotic changes in the vascular system of 41 autopsied subjects 22 Javanese and 19 Chinese Only 5 had no sclerotic changes and in 8 instances they are described as severe. The majority of the lesions were found in the aorta, and the coronary vessels came second.

ii. The authors give the following summary—

A survey has been made on the changes of the arteries in ageing of one hundred and two Javanese and sixty three Chinese, ranging from birth up to the age of seventy taking into consideration the modifications of the inner and medium layers of the arteries the appearance of the so-called chromotropic or mucoid substance and the features usually ascribed to arteriosclerosis. No difference can be found between Europeans living in Europe and America, and the above mentioned races. Accurate statistics about the occurrence of the different alterations of the arteries cannot be given because we have no knowledge of the exact age of the inhabitants of this country

A G B

DELANOË (E) Maladie de Buerger chez une femme arabe. Essai d'interprétation de la pathogénie de cette maladie son traitement. [Buerger's Disease in an Arab Woman. Its Pathology and Treatment.]—*Bull Soc Path Exot* 1935 June 12. Vol. 28. No 6 pp 460-464

Buerger's disease or thrombo-angiitis obliterans is said to affect male Jews. The patient in this instance was a female Arab After treatment which is described, she recovered.

A G B

SCOTT (H Harold) Tuberculosis in Man in the Tropics.—*Proc Roy Soc Med* 1935 Aug Vol. 28 No. 10 pp 1343-1351 (Sect. Trop Dis. & Parasit pp 61-69) [Summary appears also in *Bulletin of Hygiene*]

In discussing this subject the author draws upon his experience of making post mortem examinations on man in the West Indies and in Hong Kong and on animals at the London Zoological Gardens. Three types of tuberculosis are recognized viz. (1) natural, occurring in completely unprotected adults in infants and very young children and in other primates, (2) a chronic modified found in races long exposed to infection and (3) an intermediate or larval form.

The author next considers the two main portals of entry i.e. primary intestinal and primary lung involvement, citing autopsy records as

examples. In the case of the primary intestinal infection bacilli pass to the mesenteric glands then spread either by (a) the inferior vena cava to the right side of the heart and so to the lungs, or (b) through lumbar and inguinal glands to the falciform ligament. In the case of primary lung infection bacilli may pass (a) to mediastinal glands, pulmonary circulation by way of veins, generalization again in the lungs, thence to systemic circulation to lodge in spleen, liver and kidneys, or (b) by swallowed sputum to intestine, thence to mesenteric glands and by direct continuity to lumbar and inguinal glands and thence to falciform ligament. Difficulties arise however in the case of New World monkeys owing to the fact that they have no thoracic duct.

A summary is given of previous work by Professor BEATTIE and the author showing that two distinct forms of acute tuberculosis are to be found both in man and in other primates, viz: [a] a respiratory type with a rapidly fatal infection causing death by general dissemination of bacilli by the lymphatics and the blood vessels and [b] a primary alimentary form less rapidly fatal. Alimentary tuberculosis may also be secondary to primary respiratory infection the disease being transmitted to the intestines by the swallowing of large numbers of bacilli. In each type of disease the dissemination of infection to the lymphatic system takes place in the same order in monkeys as in man, and the proportion of alimentary tuberculosis to respiratory is probably much the same in all primates. Respiratory tuberculosis is identical in young human subjects and in other primates but in later life in the former a modifying factor comes into play. Tuberculosis in early human life is the "natural" form of the disease. In other primates the modifying factor is absent and the adults are affected in the same way as the young animals.

The author considers that the only congenital infection with *Mycobacterium tuberculosis* is by way of a tuberculous placenta. He cites a case related elsewhere of a baby 22 days old dying with a casedated focus in one lung, another 24 days old with a caseous focus in one lung and grey tubercles disseminated through both, and a third, aged 7 weeks, with extensive involvement of both lungs. SCHLUETER is also cited as having collected 12 cases of tuberculosis at birth.

An analysis of the sex distribution of 300 cases of tuberculosis in natives (Hong Kong) gives 155 males and 145 females, but the preponderance was entirely in those over 20 years of age. Up to 10 years males were to females as 4 to 5 between 10 and 20 years they were equal, and over 20 years the ratio was 3·6 to 1. In China, at least, this does not imply that the incidence is necessarily so much higher in males, the preponderance of males being probably due to the fact that females more readily go home to die and are unrecorded.

Comparing his autopsy figures on the Chinese children with those of Canti, Ghon, Albrecht and others on European children the author points out that the presence of tuberculous mediastinal glands is not invariably an indication of a pulmonary focus. Amongst 225 autopsies on children detailed in his previously published report it did not hold good in 13 per cent i.e. caseous tracheo-bronchial glands were present but no focus was discovered in the lungs. Furthermore it is not invariably true that tuberculous mediastinal glands when present bear a close relation to the focus in the lung. Again when a focus was present in the lung, tuberculous mediastinal glands were not constantly found. In the author's experience fibroold or healed foci were rarely seen in children. Instances of peculiar and unexplainable association of sites

of lesion are also cited. Thus 12 instances were met with of limitation of the disease to the lung and to the meninges. In another case there were two mediastinal glands infected but no other lesion but miliary tubercles were present in the meninges. Lastly a case is cited of abdominal tuberculosis with tubercles in the meninges and no other lesions. In these 300 Hong Kong cases there was a much greater preponderance of tuberculous meningitis amongst adults than amongst children—1 out of every 5 adults with chronic pulmonary tuberculosis showed miliary tubercles in the meninges without signs in the other viscera. Finally no cases of haemoptysis were recorded in the group of 225 children.

Discussing the severity of pulmonary tuberculosis amongst natives in the tropics the author does not think that virgin soil will explain the prevalence. Mode of life habits or change of habits industrialization overcrowding general bad sanitation early marriage frequent pregnancies prolonged lactation poor food, want of exercise and all the rest must be taken into account. Dealing with the introduction of the tubercle bacillus into native countries by infected Europeans the author concludes that every consumptive person expectorating the tubercle bacillus is to be regarded as a public menace and to the negro a very real menace. Tropical conditions are not always good for the physical European. He can it is true be more in the open air but the tuberculous subject is easily fatigued he avoids the tropical sun his rooms are shaded to keep them cool, he suffers from loss of sleep his appetite is capricious and his food less nutritious than at home. Even were it not so is it not to put it very mildly a little selfish to introduce open tuberculous cases among unprotected or even partly protected natives?

S Roadhouse Glynne

Pfleiderer (Erich) Operationsvorbereitungen in den Subtropen [Pre-Operation Precautionary Measures in Subtropical Regions].—
Muench Med Woch 1895 Apr 25 Vol. 82. No. 17
pp 661-662.

The region in question is South China. Here the natives stand operations particularly abdominal operations badly the chief conditions to bear in mind are syphilis beriberi and clonorchiasis.

Beriberi is widely distributed and in its early stages may give little evidence of its presence. In the last two years the author has administered to every operation patient whether there was suspicion of beriberi or not large doses of cardiazol, thus eliminating beriberi shock. In cases in which immediate operation was necessary cardiazol was injected once or more in the course of it.

In Kwangtung clonorchis infection is found in 18 to 100 per cent. of people according to district in seamen and fishermen in 49 and 100 per cent. respectively. The eggs must be looked for in the stools in every case. Many fatal results especially in abdominal operations must be put down to this worm. Treatment is by spirond or neosalvarsan latterly following on the work of Orro gold injections have been used, and among these the author prefers solganol B oleosum every 4-5 days in increasing doses. If there is not time for preliminary treatment liver preparations such as campolon and hepatrat are injected to reinforce the disturbed liver function.

A G B

REVIEWS AND NOTICES.

BLACKLOCK (D. B.) M.D. (Edin.) D.P.H. (London) D.T.M. (Liver.) & SOUTHWELL (T.) [D.Sc., Ph.D. A.R.C.Sc., F.Z.S., F.R.S.E.] A Guide to Human Parasitology for Medical Practitioners. Second Edition.—pp. viii + 259. With 2 coloured plates & 122 text figs. 1935. London. H. K. Lewis & Co. Ltd. [12s. 6d.]

When reviewing for this *Bulletin* the first edition of Blacklock and Southwell's little book the writer expressed the opinion that it represented "a successful attempt to meet what he has long recognized as a very urgent need—a small concise text book suitable for students commencing a study of Parasitology and particularly for those who are taking the course of instruction prescribed for the Diplomas of Tropical Medicine and Public Health." The fact that the first edition has been exhausted so quickly is a very satisfactory demonstration that teachers and students have agreed with the reviewer.

As the original edition was so excellent, it is not surprising that the new one contains but few changes. In their introduction the authors state that in revising the book they have taken advantage of the critical suggestions which have appeared in various reviews of the first edition and that they have now omitted some matter not essential and some which proved incapable of adequate treatment in an elementary book of this nature. This has resulted in the deletion of the matter relating to *Diphylidium* and of the half dozen pages devoted to drugs used in the treatment of parasitic diseases. A number of clerical and minor errors which had crept into the earlier edition have been rectified and the index has been improved.

Two features of the new edition appear to the reviewer to be unusual as to merit particular notice and special commendation. The authors have not merely successfully resisted the almost overwhelming temptation to increase the size of the volume they have actually succeeded in reducing it by twelve pages and the publishers while maintaining the same high standard of printing and finish have managed to reduce the price from 18s. to 12s. These facts suggest that the authors and publishers are determined to produce eventually something which will surely be unique viz. a wholly satisfactory elementary text-book at a price which even the unpecuniious student will regard with favour. They have our best wishes in their pursuit of this unattainable ideal.

W. York.

Manson's Tropical Diseases. A Manual of the Diseases of Warm Climates.—Edited by Philip H. MAXSON-BAER, D.S.O., M.A., M.D. D.T.M. & H. Cantab. F.R.C.P. Lond. Physician to the Hospital for Tropical Diseases London, etc. Tenth Edition. Revised.—pp. xx + 1073. With 22 colour plates, 15 half-tone plates, 381 figures in the text, 6 maps & 38 charts. 1935. London, Toronto, Melbourne & Sydney. Cassell & Co. Ltd. [31s. 6d.]

A new edition of so widely-known a manual as Manson is best reviewed by making some comparison of the new issue with its immediate predecessor. In spite of the enormous mass of new matter which the Editor has had to cope with, the bulk of the volume is but little increased, space for the records of the notable advances

in knowledge having been provided by sacrificing some of the less practical material in the domain of medical zoology, but even then sufficient is left to make the section most helpful for reference or for rapid revision. In the Editor's remodelled classification of disease a new group appears—Diseases caused by Filterable Viruses. This comprises Yellow Fever, Rift Valley Fever, Psittacosis, Rabies, Dengue, Phlebotomus Fever and the Pock Diseases, and is prefaced by an admirable preliminary discussion on the nature and characters of the infective viruses while the material in the body of the section is presented in a clear and balanced fashion that testifies to the burden of toil incurred in tracing and collating a multitude of writings on every aspect of the virus diseases. The enquiring reader will turn with curiosity to the chapter on the typhus group of fevers. This difficult and complex family which is subjected to the continual flux and stress of shifting opinion is handled with clarity and common sense and the Editor like Sir Walter's Davie Deans in matters ecclesiastical, is scrupulous in avoiding right-hand snares and extremes and left-hand way-slidings.

Everywhere throughout the book there is evidence of diligence and care in bringing the subject matter up to date and another feature which requires special mention is the expanded account of methods of treatment wherever medicaments of specific value are available. Like the foregoing edition the tenth is liberally illustrated by plates, text figures, maps and charts, a goodly number of the coloured plates are from the Editor's hand and show that he is as ready with the brush as with the pen.

The reviewer noticed only a single *lapsus calami*—and that one which involves himself. He is quoted (p. 251) as employing the masculine form of a Latin adjective with a noun which is feminine in gender! But even this most unkindest cut does not affect his opinion that the new edition of *Manson* is a worthy representative of the high traditions of its long line. W. P. MacArthur

DE LANGEN (C. D.) [Professor of Medicine in the Medical School of the University in Batavia, Java] & **LICHENSTEIN (A.)** [Formerly Lecturer in the Military Course in Tropical Diseases in Batavia, at Present Established in Amsterdam]. *A Clinical Text-Book of Tropical Medicine*. Done into English by Dr A. H. HAMILTON B.A. (Cantab.) M.D. (Penn.) L.M.B.D. First English Edition from the Revised Third Dutch Edition—pp. 557 + xxxv. With 39 plates & 12 figs. 1898 Batavia-C-Surabaya—Amsterdam G. Kolff & Co [27s.]

By those who are able to read Dutch this book has been spoken of as one of the best, perhaps the best, of text books on Diseases of Warm Climates. Now English readers have the opportunity of testing and confirming, modifying or reversing that verdict. As with all works covering a wide field, there must be inequality in the thoroughness with which the different aspects are treated, for no two authors can be expected to be fully cognizant of the most recent developments in multi-farious conditions comprised under tropical medicine.

On the whole it is a very good book, but in saying this we must bear in mind that it purports to be a *clinical text book*—it does not cover—it does not profess to cover—the larger expanse of ground such as is

included in say Manson's *Tropical Diseases*. Incidentally it is curious to note that the most recent edition of the latter bears date 1935 and appeared in November whereas the third Dutch edition of de Langen and Lichtenstein is dated January 1933 the introduction to the English translation dated 1934 the book appeared in November 1935 but is dated 1936.

The work begins with a graphic opening description of malaria, the discovery of the parasite and proof of its being the aetiological factor. In half a page the reader is put in possession of the important facts and the parts played respectively by MANSON by ROSS by GUSSI and by MACCALLUM. In some points the information is well up-to-date, unexpectedly so when we remember what time often elapses between the reception of the manuscript by the printer and the issue of the completed book. Thus we find the mention of the Schüffner dots in quartan malaria and a description of the clinical symptoms associated with infection by *Plasmodium ovale*. On the other hand there are omissions which cannot be ascribed to the translation being from a work appearing less than three years ago. For example, the account of Chagas's disease is poor the Triatomae is the only vector mentioned and the goitrous condition associated is taken for granted as aetologically connected with the infection. Under Leishmaniasis no mention is made of all the work of ADLER. As regards Yaws the authors are, apparently dualists but though there is a passing reference to yaws and syphilis (p. 113) there is no discussion of a vexed point. Perhaps the authors did not consider this necessary in a "clinical" work. MEGAW's grouping of tropical typhus is adopted, but nothing is said of the relative importance of the two types of Malayan typhus, the bush and shop types. Under yellow fever monkey infection is noted, but no reference to mice and the importance of the protection test in mice nor a single word regarding FISHER's work on this and on immunity (though HODGE's vaccine has a line). Six species of mosquitoes, in addition to *Aedes egypti* it is said may also transmit the infection to a greater or less extent but there is nothing to indicate that infection of these is experimental in the laboratory and is not proved to occur in nature. A good general account is given of Leprosy but nothing on the leprosy reaction and its treatment—a clinical matter of some importance. Climatological buboes are transiently referred to under plague but no reference has been found to lymphogranuloma inguinale and climatic bubo. Is it quite correct now to say *Br. abortus* and *Br. suis* "cannot be differentiated in the laboratory either by cultural, serological or animal tests"? Too little is made of the importance of typhoid carriers in the tropics their danger cannot be lightly dismissed in the words

Such an investigation is of but little practical significance because in any event there will constantly be new infections coming in from the native villages." Among the bacillary dysenteries the *Shiga* form is not mentioned plague is spoken of under dysentery but nothing is said of it under plague in which its use is even more *ad judicis* and d'HEURLE is given all the credit of bacteriophage introduction. Twoer is not even referred to. The importance of *Mouth* in *sputum* aetiology is overrated in accordance with modern views, but the points against it being causative are not considered. Further in a clinical text-book one would expect at least a reference to PARASIT'S researches and the results of his treatment based thereon. *Pellagra* is considered but not the many "pellagroid" conditions.

The Helminthological sections are very unequal Clayton LANE has not even the honour of mention in that of hookworm infestation. The following seems a little puzzling Blood is always absent [from the faeces] both macroscopically and microscopically Its presence indicates a complicating dysentery In the very severe stages mild haemorrhages may take place from the gut. Two pages later That chronic loss of blood from the intestinal tract occurs is certain Onchocercosis is dismissed in 10 lines and no mention is made of ocular symptoms Dracunculus has 3 lines Sparganosis almost a page

Sunstroke is dealt with in 12 lines and heatstroke is ignored poisonous snakes have a page and poisonous fish a few lines more lead poisoning practically the same. Vegetal poisons are not considered, with one exception Jenkol (*Pithecellobium geminum*)

The Index needs revision Christophers is spelt with two f's Christopherson is mentioned in the text but not in the index Fairley becomes an adverb and Shute is spelt Shule both in text and index but to the general reader these are negligible points so long as their views are correctly rendered.

It would not be fair to end on a carping note Some of the chapters have been already issued as *separate* and have received special abstracts e.g. PALTHE's on Psychiatry and Neurology in the Tropics Vos's article on Skin Cancer in Natives of the Netherlands East Indies which has been incorporated in the Cancer section [see *Bulletin of Hygiene* 1935 Vol. 10 p. 387] the chapter on Geographical Pathology [ante p. 71] and the tables of analyses of Foodstuffs. Other points to which favourable attention may be specially drawn are the table differentiating malarial and quinine amblyopia (p. 28) the graphic representation of the developmental stages of Strongylodes the coloured plate demonstrating a mode of estimating the beriberi preventing power of different forms of rice there is a good summary of Acclimatisation

In conclusion the printing is good clear and well-spaced the illustrations apposite and the coloured plates exceptionally well reproduced and the work will doubtless find a much wider public now that it has been translated for the translating has been so well done that the English reader will rarely suspect that the work was not originally written in that language

H H S

PERLA (David) [M.D.] & MARMORSTON (Jessie) [M.D.] *The Spleen and Resistance*. With a Foreword by David MARINE M.D.—pp. xi + 170 1935 London Baillière Tindall & Cox, 8 Henrietta Street Covent Garden W.C. 2. [9s.]

The study opens with a brief account of the comparative anatomy and histology of the spleen. Its development is noted, and the current nomenclature of its principal cells.

After summarizing the histological changes which occur in acute infections descriptions, largely taken from the literature follow of appearances encountered over a wide range of bacterial, virus and other infections.

The spleen is next considered as an organ of macrophage tissue Its importance in the mechanism of resistance is inferred from a

review of the abundant evidence of the phagocytic capacity of macrophage cells for all types of particulate matter and also from their behaviour towards sensitized particles.

In reviewing the literature bearing on the spleen's function in antibody formation the authors note the definite evidence of fixation of antigen by the spleen, and that in most cases splenectomy has been found to depress antibody formation.

On the question of the spleen as a site of antibody formation, the relative concentrations of antibody in various organs is discussed in some detail, although little note seems to have been taken of reports on splenic tissue culture experiments.

The second half of the study is concerned to a greater extent with observations based on the authors' researches. Splenectomy in certain animal species is shown to depress natural resistance to both acute and chronic infections. Several conditions are cited to show that experimental splenectomy may be followed by a breakdown of an acquired resistance with consequent lighting up of a latent infection. Compensating changes following splenectomy are described in the common experimental animals and remarks are made on such evidence as is available in corresponding human pathology.

Evidence from experimental splenic transplants in rats suggests that the mechanism of resistance to anaemia of *Bartonella muris* infection depends on the presence of splenic red pulp, i.e., on free and fixed reticular cells. Absence of nerve supply to such transplants is noted.

The authors describe the preparation of an ether extract of ox spleen with which they had some success in protecting splenectomized rats from the anaemia of *Bartonella muris* infection. The metabolism of copper is discussed and the spleen suggested as of importance in this connexion rather than in the metabolism of iron as previously accepted.

A chapter is devoted to some of the reasons for the wide discrepancies in existing experimental records, such as variation in relative size of the spleen in different species variations in amount of extra-splenic splenoid tissue differences associated with the age and sex of experimental animals.

References are copious throughout the book—witness the bibliography of more than 450 entries. Subject and author indexes complete an extensive study.

P. H. Marks.

SENEVER (G.) [Professeur à la Faculté de Médecine d'Alger Chef de Laboratoire à l'Institut Pasteur d'Algérie] *Les anophèles de France et de ses colonies. 1re partie. France, Corse, Afrique, Madagascar, La Réunion. Encyclopédie Entomologique. Série A. XIII. [Anopheles of France and the French Colonies, Part I.]* —361 pp. (With 148 figs. & 35 plates. 1935 Paris VIe Paul Lechevalier Editeur 12 rue de Tournon. [95 francs.]

The book is designed to give precise information about the Anophèles which occur in France and her overseas possessions, and should be of great value to the members of French Colonial Medical Services. It is planned to appear in several volumes.

The first volume, which is the subject of the present review opens with a short account of methods of collecting and breeding Anophèles; this is followed by a few pages on the external anatomy designed to assist the man who wishes to identify specimens. The author

then passes to an account of the species known or likely to be discovered in France Corsica the French possessions in Africa Madagascar and Réunion. The area under consideration is therefore heterogeneous the majority of the species of *Anopheles* having African affinities but a considerable proportion of them being members of the Palaearctic fauna. The bulk of the work deals with the species in alphabetical order which is perhaps to be regretted because the African and Palaearctic forms are mixed with one another moreover closely related species such as the members of the *marshalli* group are widely separated in the alphabetical sequence. The treatment of each species is full and apparently up-to-date. The author sets out the anatomical characters of the adult and of the early stages the geographical distribution showing the actual localities from which specimens have been recorded in a series of maps which are not very perfectly reproduced the breeding places and habits of the adult and the importance of the species as a transmitter of malaria.

To the British reader the book will be valuable partly because it gives an up-to-date *résumé* of what is known and because the author has so carefully collected available information about the distinctive characteristics in the early stages. The local lists which may be found at the end of the volume are also of great value for they tell one immediately whether a certain species of *Anopheles* has been recorded from Madagascar the Ivory Coast or some other French possession names of species likely to occur in the particular area are added.

We anticipate that the book will be almost as much appreciated in British possessions as in French

P. A. Buxton

ROCKEFELLER FOUNDATION Annual Report 1934 [MASON (Max) President] — pp. xiv + 408. With 17 figs. (1 map) on 11 plates New York 49 West 49th Street.

Although the President of the Rockefeller Foundation refers in the preface to the Annual Report for 1934 to the difficulty in deciding upon the allotment of funds when increased opportunity and need coincide with diminished resources there seems to have been little or no diminution during the year in the amount of work carried on with the help and under the auspices of the Foundation. As in former years there was active research in the field on yellow fever malaria hookworm disease undulant fever yaws tuberculosis diphtheria and other diseases. Much help was given to promote the training of men and women in public health work and a large number of fellowships were granted. The branch of medicine specially selected for support was that dealing with derangements and diseases of the nervous system and considerable financial aid was given for the endowment or establishment of special departments in existing institutions for research in mental diseases.

In that part of the report referring to the International Health Division many matters of interest are recorded. Considerable progress has been made in the study of the epidemiology of yellow fever and the tests for acquired immunity to the disease have confirmed the opinion expressed in the report for 1933 that a mild form is widely prevalent among both white and black races. The recognition of what is called Jungle Yellow Fever is of great importance. Four outbreaks of yellow fever occurred in Brazil Bolivia and Colombia in none of which *Stegomyia (Aedes) aegypti* mosquitoes were found

In April 1934 "an unusually rapid and fatal form" was present not far from Cuiaba, the Capital of Matto Grosso Brazil, in an area where Stegomyia does not occur so far the carrier in these epidemics has not been identified. The fact of the absence of the mosquito in these cases does not of course lessen the importance of Stegomyia as the vector of yellow fever in urban and other districts, but it certainly indicates that the problem of yellow fever requires further study.

The control of malaria in Italy is dealt with at some length. The introduction of the small fish, *Gambusia*, led to very successful results in one small area in Istria, where the only antimalarial measure employed was stocking with this fish, malaria has practically disappeared. In some other districts good results were obtained by the treatment of mosquito breeding sites with Paris Green.

In the field of Natural Science the Foundation, in accordance with its general policy of concentration on fewer subjects, selected that of experimental biology. Space does not allow even for the bare enumeration of all the subjects of medical interest to the furtherance of which help was given among them were heredity and genetics, endocrinology and the physiology of respiration and reproduction.

A map of Europe (excluding Soviet Russia) is given in the report, showing the places where the Foundation is engaged, or is giving assistance in public health work practically every country in the continent is included.

As in former years, this Report is a record of excellent work well planned and well carried out. It shows how much good can be done when knowledge and the means to utilize it are combined with sympathetic and able administration. *H. J. Walker.*

ROCKEFELLER FOUNDATION International Health Division. Annual Report 1934—235 pp. With 22 figs. on 12 plates. New York 49 West 49th Street.

The benefactions of the Rockefeller Foundation are so many, so great and so varied that no review can do them justice. In the Foundation's Annual Report about 60 pages are given to an account of the work of the International Health Division the separate report concerning the activities of this Division is a book of over 200 pages and even in it little actual detail is included. In the following brief review some of these activities are indicated.

Until the beginning of the present century yellow fever was a constant source of dread in the west, and a grave menace, especially in seaports and to shipping. Since that time, owing to work in great part instigated, inspired and financed by the Foundation, so much has been accomplished that yellow fever no longer occupies the chief place in the minds of health officers of American continents. Details are given of the campaigns against this infection in Havana, Panama, Rio de Janeiro, Guayaquil and elsewhere and much has been learned from research after the discovery that monkeys and mice were susceptible and that the danger for workers might be reduced almost to vanishing point by serum-virus inoculation.

Fresh ground has been broken in the discovery of a new rural type of yellow fever which can occur in absence of *Aedes aegypti* in places where the land has been incompletely cleared of forest and jungle and in isolated spots. Its mode of transmission in these circumstances has

yet to be determined. Other research has been directed to improving the method of vaccination and work is being prosecuted in laboratories in New York City in Rio de Janeiro and in the Institut Pasteur Paris.

Much also is being attempted and a good deal accomplished in investigation of and research into malaria. There is the Malaria Experimental Station in Italy under Professor Missiroli in Rome and small laboratories are established elsewhere. Work of a preventive and control character by drainage by engineering measures and by field experiment in many parts of the world is in progress—in Albania, Bulgaria, Greece, Spain, Spain, Portugal, in Colombia, Panama, Costa Rica, Porto Rico, Jamaica, the Virgin Islands, the Philippines.

By field study five varieties of *A. maculipennis* in addition to the type *A. maculipennis* Meigen have been found in Europe viz. *mesciae* Fallerini, *melanoon* Hackett, *atroparius* van Thiel, *labranchiae* Falleroni, and *elidus* Edwards. Further new drugs in treatment are being tested, the experimental work being first carried out on avian malaria.

Nations infested by hookworm again claim a large share of the bene factions of the Rockefeller Foundation. Re-surveys have been undertaken in the southern United States, soil sanitation is being taken in hand especially in Egypt, control measures in Samoa and the South Pacific Islands and elsewhere and research into the relations and connexion between defective nutrition and hookworm anaemia.

Special mention must be made of *yaws* control in Jamaica and the study incriminating *Hippobates pallipes* as the most likely vector in the island [see this *Bulletin* 1935 Vol. 32 p. 885 and Suppl. p. 233*]. The extensive campaign for treatment of the disease in Western Samoa must not be forgotten [*Ibid.* 1934 Vol. 31 Suppl. p. 165*].

Tuberculosis investigations are being pursued in the West Indies and in the United States in rural Michigan in Tennessee and the question of control in Panama and Porto Rico. Mention of other diseases in which study is being carried on should not be omitted such as diphtheria, Rocky Mountain fever and undulant fever.

Apart from all this the Foundation gives aid to State and Local Health Services in Tennessee, in Quebec, in the United Provinces (India) in China and in Java. It has also divisions of Vital Statistics and Epidemiology and it supports many Public Health laboratories and nursing and education and schools of Hygiene. Whether the Rockefeller Foundation has or has not a motto it certainly is a firm believer that *nullus argento color est nisi temperato splendeat usus* and thereby effects the greatest good to the greatest number. *H. H. S.*

LONGMANS AFRICAN HYGIENE PICTURES No 1 Water No 2.

Files. No 3. Mosquitoes. No 4 Worms and Disease. [Size 22½ x 30 ins. 2s. the set.] How to use the Hygiene Pictures. A Teachers Handbook.—15 pp [6d.] 1935 London Longmans Green & Co. Ltd.

These publications consist of four black and white wall pictures for use as subjects of hygiene lessons in African schools and a leaflet giving practical suggestions to teachers on how the pictures can best be used in class teaching. Each picture gives several scenes of African life illustrating the lesson it is designed to teach. Thus the first picture shows a water supply being fouled by cattle and by human beings washing themselves or their dirty clothes in it or using the bank as a latrine and brings home to the African children the important lesson

that the village water supply must be kept clean by enclosure or other means, and that drinking water should be boiled. The second picture shows how flies carry disease and how they may be got rid of, or at least prevented from doing harm by keeping the house clean, burning rubbish covering foodstuffs, and other such measures. The third picture illustrates the life-history and breeding places of the two common disease-bearing mosquitoes, anopheles as carrier of malaria and culex as carrier of filaria, and shows how they may be controlled by cutting the grass and clearing the bush round the houses, and by clearing up old tins and swampy ground and putting kerosene on the top of water in tanks. The fourth picture, which is perhaps the most difficult of the series for children to understand, is entitled "Worms and disease." It shows the life-history of the tapeworm, guinea-worm, bilharzia and hook worm, and sums up methods of prevention in the words Boil your drinking water Cook your food thoroughly Wash uncooked vegetables Build a pit-latrine and use it. R. L. S.

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SLEEPING SICKNESS

LESTER (H. M. O.) Report of the Tsetse Investigation.—*Nigeria Rep. Med. & Health Services for Year 1934* Appendix B pp 69-83.

In order to provide more funds for sleeping sickness work in the field and for the equipment of sleeping sickness dispensaries there has been a curtailment of the research side of the work and the posts of Senior Sleeping Sickness Officer and Assistant Veterinary Pathologist have been abolished. Although Gadau is an excellent site for a research station its inaccessibility has made co-ordination of the various field activities and co-operation with the administration increasingly difficult. For these reasons the head office was moved to Kaduna. In future the European Staff of the investigation is to consist of the Deputy Director at Kaduna, the Sleeping Sickness Officer the Entomologist, and the Technical Assistant at Gadau and six Sleeping Sickness Medical Officers in the field.

Research Work.—A series of new chemical compounds were supplied by the Bayer firm for examination of trypanocidal properties. The experiments started in 1933 with Surfen C and Sdt. 396B and have been continued. In addition observations have been made with preparations 6210 and 6358 which are of a character similar to Surfen C and contain no heavy metal and with preparations 5547 6690 and 7217 which are compounds of arsenic and antimony.

Surfen C is unlikely to be of much value in the treatment of man owing to its destructive action on the kidneys. In mice the drug was effective against *T. brucei* and *T. congolense* and strains isolated from man. With sheep infected with strains of *T. vivax* and *T. congolense* a dose of 10 mgm. per kilo proved to be more effective than a standard dose of tartar emetic but three doses of Surfen C given at weekly intervals did not prevent relapse. Preliminary experiments on cattle infected with *T. vivax* and *T. congolense* having proved hopeful, it was decided to extend the work and to compare the action of one intra muscular injection of Surfen C with that of three injections given at weekly intervals and with a course of 3 weekly injections of tartar emetic on groups of cattle infected with pure *T. vivax* *T. congolense* and a mixed infection of these trypanosomes. Some 30 animals were allocated to each experiment. Of these 6 were given 3 weekly doses of Surfen C (10 mgm. per kilo) 12 were given single doses of the drug 6 were given the routine course of tartar emetic (0.06 to 0.08 cc. of a 4 per cent. solution per kilo of body weight) and 6 were left untreated.

as controls. Details of the experiments, which were unfortunately somewhat complicated by an outbreak of rinderpest, are given in a table. From the point of view of a definite cure, the results were not good, as the majority of animals relapsed within a few weeks. These findings differ from those of Hornby in Tanganyika, who reports that the majority of *T. congolense* cattle which he treated with one dose of Surfen C did not relapse. Although the three doses of Surfen C failed to sterilize the infection it is to be noted that 100 per cent. of the animals were alive after six months, whereas only 6·2 per cent. of the controls survived for the same period.

The action of Sdt.388 B in mice infected with *T. brucei* was much the same as that of Surfen C. It was fairly active against strains isolated from man but not good against *T. congolense* in mice. Some preliminary tests have been carried out on man. The initial dose was 0·1 gm. and this was followed by 0·15 gm., 2 grams, 2·5 gm. and 0·3 gm. at weekly intervals up to a total of 1·75 gm. [So given in the text, probably misprints for 0·15, 0·2, 0·25 and 0·3 gm.] With 4 late cases the results were not good—the patients continued to go downhill and a treatment of tryparsamide had to be instituted. The earlier cases reacted better and brief notes are given of 11 such cases. Although the drug was active in these cases it was not so effective as a course of Bayer 205 would have been.

The other preparations from the Bayer Company referred to above were tested on mice infected with various trypanosomes.

Compound S. 107—This substance was sent to the author by the reviewer who had selected it from a large number of arsenical compounds prepared by Professor Morgan under the auspices of the Chemothapy Committee of the Medical Research Council. The drug was tested on eight cases of sleeping sickness—an initial dose of 1 gm. and subsequent doses of 2 gm. were given at 5 or 7 day intervals, until 25 to 30 gm. had been administered. The stimulant action was very pronounced and led to the difficulty commonly met with in experimental work with tryparsamide. The patients felt so much better that they became tired of the prolonged treatment and absconded before they had completed the course of injections. In every case patients showed very rapid clinical improvement and thought themselves completely cured after they had received 5 or 6 injections. In one case trypanosomes could still be detected in the blood after the 8th injection, but disappeared later and in two cases trypanosomes persisted after the 6th but disappeared by the 9th injection. In two cases which completed the full course of treatment the cerebrospinal fluid cell count fell from 332 to 1 and from 238 to 39 respectively. In the third there was an increased cell count at the time of the final examination. Taken as a whole, the results were definitely promising. No late cases were included in the series but it is noteworthy that one very advanced case, which had failed to react to full courses of tryparsamide, of Bayer 205, and of Antrypol, for some reason or another improved markedly on being given a course of this new drug. At the suggestion of the reviewer who had found that S.107 was less toxic than tryparsamide these observations are being extended and the patients are being given initial doses of 1·5 gm. and subsequent doses of 3 gm.

An experiment to ascertain the effect of exposing "preimmune" animals to fresh infections did not give very hopeful results, as, up to the time of writing, viz. two months after the first exposure to *G. morsitans* 6 of the 9 preimmune cattle have died.

During the last three years various strains isolated from man and originally sensitive to tryparsamide have been maintained in guinea pigs which have been given increasing doses of this drug. Although many hundreds of injections have been given the strains are not yet completely insensitive to a dose of 4 gm. of tryparsamide per kilo. Lester writes that the fact that it is so difficult to induce an artificial drug-resistance in strains maintained in guineapigs shows that the natural resistance of the host must be an important factor in the production of this artificial resistance. There is as yet no experimental proof that repeated ineffective treatment of a human case of sleeping sickness with tryparsamide can make the strain resistant to that drug. We know that resistant strains are comparatively common but as such strains have been isolated from untreated cases in districts where no sleeping sickness work has been done previously it is certain that in many cases this resistance to drugs must be a natural characteristic of the strain. The question whether ineffective treatment in man can make trypanosomes increasingly drug resistant is an important one and the point is now being investigated.

Experiments on fly transmission showed that it was noticeably easier to pass a strain isolated from man through *G. tachinoides* than through *G. submorsitans*. In dissections made in the field infections in *G. palpalis* are usually found to be very scanty whereas in *G. tachinoides* an infection rate of 20 per cent. is common at a certain time of the year. Similarly under laboratory conditions it seems easier to transmit human strains through *G. tachinoides* than through *G. palpalis*. This appears to be an important point and possibly accounts for the divergent views of workers in East and West Africa on the question of non-transmissible strains.

From the Report of the Entomologist it appears that for nearly two years frequent censuses of the tsetse population have taken place along a track of 3½ miles in length. This track passes through different types of tsetse bush. At the beginning of the rains the population of *G. submorsitans* starts to increase and reaches its maximum by the end of the wet season. Soon after the dry season begins the population starts to decrease and from December to April it is at its lowest. These facts in the main also hold good for *G. tachinoides* and furnish a further argument for making anti tsetse clearings early in the dry season. Not only do they then produce more lasting damage to the vegetation but they strike at the fly community when it is entering upon an unfavourable season.

Other entomological work includes an experiment on the longevity of tsetse. This is tending to show that the patches of riverine forest are not such perfect dry sanctuaries as had been surmised, but that the fly just manage to survive the climate of the dry season in sufficient numbers to continue the species.

The remainder of the Report is concerned with the Sleeping Sickness Service. During the year 43 017 cases of sleeping sickness have been diagnosed by the Tsetse Investigation staff. Of these less than 800 cases have been treated previously. Altogether 47 187 cases have been treated during the year. Throughout the period six fully equipped teams have been at work in the field, each consisting of one medical officer, 2 African nurses and 18 to 24 trained African dispensary attendants.

The great majority of the cases have been treated with a course of 20 to 25 gm. of tryparsamide. Adult patients have been given an

initial dose of 1 gm., followed by 2 gm. doses at 5-day intervals. It has been found that in the field it is not safe to give larger doses than 2 gm nor to make the period between 2 injections less than 5 days. The occurrence of ocular symptoms was much more common when attempts were made to intensify the treatment. Portable stills were supplied to each team and distilled water was used for practically all injections. This was found to be a great improvement. In the past, patients complained of a variety of mild toxic symptoms particularly after the second injection. It had been noticed that this was a very local occurrence in some areas nearly all the patients complained of malaise headache and fever. In rare instances there was actual diarrhoea and vomiting. Such symptoms only occurred when boiled and filtered water was used instead of distilled water.

Antrypol, a British made substitute for Bayer 205 was available towards the end of the year. Patients are at present being given 3 doses each of 1 gm. of Antrypol, followed by a course of 9 to 11 gm. of tryparsamide with both drugs the interval between injections is 5 days.

An account of the work of the six sleeping sickness teams is then given and their observations are summarized in a table. W York.

GILL (C W Hope). The Problem of *T. gambiense* Sleeping Sickness in Southern Nigeria.—*Brit African Med J* 1935 Jan. Vol. 8 No. 3 pp. 10-15 [11 refs.]

In this lecture the author gives a general account of sleeping sickness. It contains nothing new. W Y

NIGERIA, COLONY AND PROTECTORATE OF ANNUAL REPORT OF THE VETERINARY DEPARTMENT 1934 [HENDERSON (W W) Chief Veterinary Officer]. [Trypanosomiasis pp. 11-13]

Trypanosomiasis in Nigerian cattle is widespread and causes serious economic losses. In the great majority of cases it assumes a chronic form and when living conditions are favourable it frequently produces no apparent ill effects but when conditions are unfavourable—shortage of food, cold and wet weather—it frequently causes death.

The only practicable method of dealing with the problem is the curative treatment of sick animals. During the year 14,000 cattle have been treated with 3 or 4 intravenous injections of a 4 per cent. solution of tartar emetic every 5 or 7 days [dose not stated]. The results on the whole have been good and the treatment is popular with the owners. Brief details are given of 275 cattle treated in this way 17 (6 per cent.) died during treatment or within 3 months thereafter. It is stated that without treatment the death rate may be as high as 50 per cent. and in addition there is economic loss from general ill-condition.

A summary of the result of treatment by this method at the immunization camp at Zaria is given by the Deputy Chief Veterinary Officer, Mr Griffiths. During the past four years 10,854 cattle have been treated, and provided the animals were not too emaciated and weakened there was almost invariably an improvement. The actual deaths while under treatment amounted to 2.8 per cent., but this mortality is among animals able to travel into camp from a distance among animals treated by itinerant inoculation in the bush the mortality may be as

much as 10 per cent. or even higher. The general opinion among officers of the veterinary department is that provided the antimony tartrate treatment is carried out before the disease has progressed to the stage when the animals are weak and emaciated the results are good. It is also stressed that the treatment is extremely cheap and this is, of course a very important matter.

The drug is also used as a prophylactic for trade cattle travelling by road, in order to reduce the losses which often occur during the journey. These injections have become popular with cattle traders. Experimental work is being carried out in collaboration with the Director of Tsetse Investigation on the curative value of a Bayer product known as Surfen C.

W Y

MACLEAN (G) Die Bekämpfung der Rhodesiense-Form der Schlafkrankheit in Tanganyika. [The Fight against Rhodesian Sleeping Sickness in Tanganyika.]—*Arch f Schiffs u Trop Hyg* 1935 Sept Vol. 39 No 9 pp 381-389 With 1 fig

This paper gives a general account of the measures which are being adopted in Tanganyika to combat sleeping sickness.

The two tsetse concerned in the spread of *rhodesiense* sleeping sickness in Tanganyika are *G. morsitans* and *G. steynneri*; although it is possible that *G. pallidipes* may play a small part. How *T. rhodesiense* was introduced into Tanganyika is unknown. Possibly it was brought in by travellers or soldiers infected in Nyasaland, Portuguese East Africa or Rhodesia; possibly *T. gambiense* from the Congo, Uganda or various foci in Tanganyika itself had become modified by change of insect vector into *T. rhodesiense*; possibly it originated from *T. brucei* of game; or possibly the original inhabitants of the country were able to harbour the parasite with little evidence of disease.

However the disease was introduced there can be no doubt that an important factor in the production of the epidemics of *rhodesiense* sleeping sickness has been the dispersal of the natives about the country and their consequent more intimate contact with tsetse.

In order to combat the disease it is necessary either to attack the virus by treating the sick or to break the contact between man and the fly. In practice it is extremely difficult to achieve success by one of the measures alone; the best results are obtained from a combination of both lines of attack. The methods of treatment employed in Tanganyika are—

(a) *Early cases*—Bayer 205 1 gm. weekly for 4 weeks or Bayer 205 1 gm. on the 1st, 3rd, 5th and 8th days and 1.5 gm. on the 15th, 22nd and 29th days.

(b) *Advanced cases*—After a series of injections of Bayer 205 a course of 12 weekly injections of 2 or 3 gm. of tryparsamide.

In a country of more than 450 000 square kilometres covered with tsetse bush, and in which the population is rarely more than 10 and often only 1 or 2 persons per sq. kilometre it is obviously impossible to search out all the sick and treat them. Obviously it is first necessary to bring the people together into closer settlements, and this has the great advantage of increasing the areas under cultivation and so lessening the contact between man and fly.

In 1922 during the epidemic in Maswa no Bayer 205 was available but fortunately there existed in the neighbourhood a wide stretch of

open land in which the people could be settled. In Ukonongo, however there existed no such free land, so an especially fertile region was selected in the bush and the natives caused to farm it, thereby producing a centre in which the treated sick could earn their living and at the same time lessen contact between man and the fly. There was the possibility that the aggregation of so many sick might lead to a spread of the disease, but it was hoped that this could be prevented by the use of Bayer 205. \yonga was chosen for the first experiment of this kind. At the middle of 1925 \yonga was inhabited by only two or three families and apart from the small clearings made by these people there was nothing but fly-infested bush. The settlement commenced in August 1925 and the subsequent history is shown in the following table —

Year	Area of cultivation sq. Kilometres	Inhabitants	Infected with <i>T. rhodesiaca</i>	
			Per mile	% Infected
1925	8	1,400	29.0	9.45
1926	23	2,308	30.4	13.0-14.7
1927	77	3,000-4,000*	30.4	4.30-6.47
1933	65	3,222	40	

*Census uncertain.

Details are given of other similar schemes.

IT Y

UGANDA PROTECTORATE ANNUAL REPORT OF THE VETERINARY DEPARTMENT FOR YEAR ENDED 31ST DECEMBER, 1934 [P.C.R.O. (W. F.) Director] pp. 9-11—Glossina Investigation and Reclamation.

The *G. morsitans* reclamation work in South Ankole during 1934 was directed towards the control of grass fires and general observations on "fly" density. The unusual dryness of the year made it apparent as early as April that great difficulty was going to be met with in protecting the South Ankole clearings from unauthorized burning of grass and from premature firing. Some of these difficulties are described.

The various acacias and *Euphorbia candida*, and also the rhus and grewia thickets, showed to an increasing extent the cumulative effect of controlled annual burnings, and the great majority of the uncut areas have become far more open than they were three years ago. There is moreover a strong impression that in certain areas the grass growth and grazings have improved.

In uncut areas there is a continued decrease in fly catches, and in the clearings the fly has entirely disappeared apart from an occasional straggler. The concentration of *G. morsitans* in the North Kabiganda, referred to in the 1933 report, suffered rather more disturbance in 1934 than was anticipated, owing to increased mining activity and can leaving that area were estimated to carry not less than 50 to 60 flies per journey from the untouched focus to the main road on the south, or to the track by the uncut belt of acacias there situated and from which *G. morsitans* had previously almost entirely disappeared. The position was met by "catching" in the acacias and by the construction of a grass-walled fumigation house across the car track.

Cultivation in this section is steadily increasing round the base of the hills and sheep and goats are being kept in increasing numbers. The entire fly country of South Ankole presents a very different feature from that of 1930 when the population was sparse and density of thorn bush and tsetse was very great.

It was stated in last year's Report that the country to the north of the River Ruizi appeared free from tsetse but more recent work has shown the presence of several small foci which have probably been the cause of the fairly constant outbreaks of trypanosomiasis in cattle.

W Y

UGANDA PROTECTORATE ANNUAL REPORT OF THE VETERINARY
DEPARTMENT FOR YEAR ENDED 31ST DECEMBER, 1934 [POULTON
(W F) Director] Appendix II pp 26-28.—Trypanosomiasis
[BIETTAM (R W M) Veterinary Pathologist]

In last year's report it was stated that a number of game had been inoculated with *T. congolense* and *T. brucei*. Attempts made during the present year to reinfect a duiker and a waterbuck failed. This work suggests that in nature the game acquire a transient infection and thereafter resist further infection. If this be so they would except for a short period be non infective for tsetse. A young oribi caught in a non-fly area was inoculated with *T. congolense*; it made a natural recovery after a transient infection. A wild pig resisted infection with this trypanosome thus confirming similar observations made in previous years.

There is an impression that *T. congolense* in cattle on Buvuma Island is being transmitted mechanically by some of the many voracious blood sucking flies which exist in great numbers near the kraals viz Tabanidae, Haematopota, Lyperosia and Stomoxys. The few *G. pallipes* present can play only a subsidiary rôle. *G. palpalis* is numerous but dissections show that very few are infected with *T. congolense*.

Experiments with *T. brucei* and *T. rhodesiense* show that both parasites are definitely pathogenic for stock for about six months after infection but that if the animals are cared for and well fed they steadily put on weight and recover. It is however fallacious to regard *T. brucei* as a non-pathogenic parasite for cattle as is believed by many workers. *T. brucei* is a serious menace to cattle in a *G. morsitans* area, and when superimposed on *T. congolense* causes a more rapid decline of health and is more fatal than *T. congolense* alone. It is stressed that it is extremely difficult if not impossible to diagnose *T. brucei* in the bovine without recourse to small animal inoculations and that *T. brucei* is extremely resistant to treatment of all the drugs tested during recent years only Surfen C has given encouraging results. It is believed that owing to the difficulty of diagnosis the part played by *T. brucei* in bovine trypanosomiasis has not been fully recognized in the past many cases regarded as pure *congolense* infections especially those which have resisted antimony or tartar emetic and have relapsed, have subsequently been found infected with *T. brucei*.

Further experiments have been made on the action of Surfen C in *T. congolense* and *T. brucei* infections. The dose (100 cc.) is divided into two parts and injected intramuscularly there is no local or general reaction. Nineteen cattle infected with *T. congolense* were treated in this way one was in very poor condition and died, but the rest

recovered and subinoculation tests suggest they are sterilized. Surien C gave equally good results with two cattle infected with *T. brucei*. Prophylactic tests have given promising results. W Y

SOUTH AFRICAN MEDICAL JOURNAL 1935 July 27 Vol. 9 No. 14
p. 474—Sleeping Sickness in the Bechuanaland Protectorate.

This editorial article draws attention to the existence of a focus of human trypanosomiasis in Ngamiland on the borders of the South African Union. In Ngamiland chiefly in the Okavango and Chobe swamps a fatal disease called by the natives Kgotsela, meaning light, intermittent shiver has been known to exist. In 1909 Dr Moryar of the Bechuanaland Medical Service investigated the disease, but his findings were inconclusive. In November 1934 Dr McKenna reinvestigated the disease in natives in the Chobe district, and succeeded in proving that it was in reality trypanosomiasis. Obviously it is of importance to the Union that the whole situation should be carefully examined. W Y

PORTUGUESE GUINEA. Ecole de Médecine Tropicale. Rapport de la Mission Médicale à la Colonie du Guinéa en 1932 [ou Segundo (Luis Artur Fontoura)]. [School of Tropical Medicine. Report of the Medical Mission to Guinea in 1932.]—86 pp. With 10 photos on 5 plates, 1 folding map & 48 figs. tables and graphs. Lisbon.

In his introduction the author quotes from the reports of previous investigators which indicate an amazing ignorance regarding the question whether or not sleeping sickness actually existed in Portuguese Guinea.

The author arrived at Bolama in April, 1932, and found a case of sleeping sickness on the Island almost immediately. At the end of the month he moved inland and established his laboratory at Boba, after spending May and June examining the population of this district he shifted his laboratory to Bissau and transferred his attention to the north and east of the Colony. Later he returned to Boba with a mobile laboratory in order to examine the infectivity of the three species of *Glossina* which exist there. At the end of November after spending 7 months in the Colony he returned to Lisbon accompanied by 3 cases of sleeping sickness in order to make a study of the trypanosomes with which they were infected.

The report is divided into three sections.—The first deals with human trypanosomiasis, the second with trypanosomiasis of domestic stock, and the third with *Glossina* and their degree of infection. Before leaving the Colony the author addressed a letter to the Governor enclosing particulars of 18 cases of sleeping sickness which he had discovered in various parts of the Colony. The general conclusion reached regarding human trypanosomiasis in Portuguese Guinea is that it is mildly endemic and is distributed irregularly throughout the Colony. The journeys of the author and the distribution of human trypanosomiasis and the various species of *Glossina* (*palpalis longipalpis submorsitans* and *fusca*) are indicated in a map.

The first portion of the report consists of a lengthy clinical account of the disease as found in Portuguese Guinea, and this is followed by an equally long account of the trypanosome itself. It contains nothing new. In the second portion of the report the author remarks that he

has examined only animals which looked ill. Of these 28 per cent proved to be infected. The usual three parasites were found viz.—*T. vivax*, *T. congolense* and *T. brucei*. A lengthy account of the morphology and pathogenicity of each is given but here again there is nothing new. The third section contains a table showing the number of *G. longipalpis*, *G. palpalis* and *G. submorsitans* dissected and the percentage of each found infected with the various trypanosomes.

W Y

ZUMPT (F.) Das Glossinenmaterial der deutschen Museen ein Beitrag zur Verbreitung der Tsetsefliegen [The *Glossina* Material in German Museums a Contribution to Knowledge of the Distribution of the Tsetse-Flies.]—*Arch f Schiffs u Trop Hyg* 1935 Aug Vol. 39 No 8 pp 328-337 (With 1 fig)

Since the publication of his former paper in April, 1935 [see this *Bulletin* Vol. 32 p 722] the author has extended his knowledge of the genus *Glossina* by referring to the collections in a number of German museums and the distributional details now given are derived partly therefore and partly from previously published records. *G. martinii* which as already stated (*loc. cit.* p 723) should in the present reviewer's opinion be regarded provisionally at any rate as a form of *G. palpalis* was described by Zumpt from material from Bismarckburg near the extreme southern end of Lake Tanganyika. Further examples of this form from Usumbiro (at the opposite end of the Lake) and from Morogoro district (inland from Dar-es-Salaam) have now been identified besides others taken in a sleeping-sickness camp at an untraceable locality called Rumenge Post Mjudje. [There is grave reason to doubt the accuracy of the Morogoro record since it is in the highest degree unlikely that any form of *G. palpalis* occurs in that region.]

To anyone familiar with the great collection of tsetse flies in the British Museum (Natural History) the present paper will be found to contain little that is new yet one or two details may be noted. The statement that the Berlin Museum possesses *G. brevipalpis* material from the River Omo is, so far as the reviewer is aware the first published record of the occurrence in Abyssinia of any species of *Glossina*. Confirmation in this case is needed, as also in connection with the subsequent mention of the possession by the same Museum of specimens of *G. morsitans* from Massaua—an assertion which if true might conceivably have an important bearing on present events.

The synonymic list with which the paper concludes is compiled from well-known publications.

E E Austin

LE PORT (L. René) Les plaxo-choroidites rhomboidiennes au début de la maladie du sommeil. [Plexo-Choroiditis of the 4th Ventricle at the Beginning of Sleeping Sickness.]—*Bull Mtl du Katanga* 1935 Vol. 12 No 2 pp 41-43-9 51-5

The author describes certain changes in the choroidal plexus which appear very early in sleeping sickness and which in his opinion explain a number of hitherto inexplicable symptoms met with at the beginning of the disease.

These very early changes in the choroidal plexus are almost entirely confined to the 4th ventricle. Their immediate consequence is an interruption of the communications between the ventricles and the

subarachnoid space. The only real orifices by which these two cavities communicate are the foramina of Luschka, which lie between the cerebellar peduncles in the lateral angles of the 4th ventricle. These orifices are covered by the lateral choroidal plexuses of the ventricle. It is necessary also to mention the small foramen of Magendie, the permeability of which is doubtful, but which can nevertheless, when it is not reinforced by a fibrous thickening of the median plexus, serve the functions of a safety valve.

Obstruction of the foramina of Luschka results in separation of the subarachnoid space from the ventricles, where all the cerebro-spinal fluid is produced, and this automatically causes a state of disequilibrium of the tension of the fluid between the two cavities. The occlusion may reach a point—fortunately very rare and transient—where all the fluid produced is retained in the ventricles.

This condition of intraventricular hypertension gives rise to a syndrome to which the author wishes to draw attention for it is responsible for a large proportion of the troubles met with during the first stages of sleeping sickness.

Occlusion of the foramina of Luschka is rarely complete and if it is complete it is very rarely permanent. The usual condition is one in which the obstruction is sufficient to produce a slight disequilibrium between the intraventricular pressure and that of the subarachnoid space. Lumbar puncture reveals either a slightly diminished pressure or one that is normal. But clinically intraventricular hypertension manifests itself by the following symptoms—headache, nausea, and a certain degree of somnolence or even of indifference. Headache is the most severe of these symptoms, the nausea is due to pressure on the 4th ventricle and is independent of troubles arising from digestive disturbances and the somnolence has nothing to do with the toxic condition seen in advanced cases of the disease. Although papillary signs are rarely met with a few patients may complain of floaters and flickerings. This little syndrome of intraventricular hypertension is not influenced by lumbar puncture.

When the lateral plexuses are hypertrophied to an extent that they completely occlude the foramina of Luschka, the syndrome of hypertension is much more pronounced. In this case the two dominant signs are most intense headache and psychical troubles with suicidal tendency. A third sign may be indications of papillary stasis. It is interesting to note that although the syndrome increases progressively in severity when it abates it does so suddenly.

In these cases the subarachnoid pressure is a little lowered, and that it is not more so is due probably to the fact that the intraventricular pressure forces the fluid bathing the cortical convolutions into the subarachnoid space. Lumbar puncture may relieve the patient instantaneously because the removal of fluid may accelerate the extraventricular prolapse of the plexus blocking the foramina of Luschka or it may render effective the foramen of Magendie. If, after 24 hours, the patient's condition is not relieved, a further lumbar puncture should be made. If the tension is lower than at the first puncture then obviously the desired removal of the obstruction has not been accomplished, and in order to avert damage due to hypotension a quantity of physiological saline equal to the volume of fluid previously withdrawn should be injected. If however the pressure is normal or raised, then either the block has been insufficiently removed or possibly the cavities still contain too much fluid in such

cases more fluid should be withdrawn. This type of syndrome due to intraventricular hypertension is rare the author has met with it only 11 times out of 2 000 cases.

A third type which le Port has seen on only 4 occasions is that in which the foramina of Luschka and also that of Magendie are blocked by plexus which is firmly fixed by fibrous adhesions. In such circumstances the patient dies quickly with exaggeration of the symptoms mentioned above. Details are given concerning these 4 patients.

Discussing the general evolution of plexo-choroiditis in trypanosomiasis the author states that it is characterized by two phases firstly a hypertrophic phase seen during the first stage of the disease and secondly a fibrous atrophic phase met with in the middle and last stages of the disease. The syndrome of intraventricular hypertension is therefore most marked in the earlier stages of the disease and tends to disappear later on. It is probable however that the fibrous transformation of the plexus seen in the later stages of the disease plays a certain rôle in the toxicity of the cerebrospinal fluid.

In 25 autopsies le Port has found 19 cases of more or less marked plexo-choroiditis of the 4th ventricle and 2 cases of very severe plexo-choroiditis. Among the 2 000 sleeping sickness cases seen since 1929 361 had slight hypertension 11 had moderate or severe hypertension which was reducible and 4 cases had a severe irreducible hypertension.

IV X

SICÉ (A) & MOREAU (P). Quelques réactions du système extra pyramidal au cours d'une méningo-encéphalite trypanosomique. (Some Extrapyramidal Reactions in a Case of Trypanosomal Meningo-Encephalitis.)—*Bull Soc Path Exot* 1935 Oct 9 Vol. 28. No 8. pp 722-726

Details are given of a chronic case of trypanosomal meningo-encephalitis in a Senegal soldier who the history shows must have contracted the disease at least 3 years before he came under observation. When he was sent from Algiers to Marseilles in May 1935 the only signs of disease were tremors of the tongue and fingers the absence of abdominal reflexes and of the ankle jerks and a slight reaction of the cervical lymphatic glands. The blood was negative both on direct examination and also when examined by the method of triple centrifugation there was auto-agglutination of the red cells. Gland puncture showed the presence of trypanosomes. Lumbar puncture showed a clear fluid pressure normal, 2 000 cells per cmm albumen 0.85 per thousand sugar 0.50 per thousand and chlondes 6.17 per thousand scanty trypanosomes were discovered on centrifugation.

The case had evidently progressed in the most insidious manner without affecting the general health. There was no history of fever or emaciation nor during the three years he had spent in Algiers after leaving French West Africa did he show any evidence of apathy or lassitude or mental disturbance.

IV Y

DUKE (H Lyndhurst) On the Factors that may determine the Infectivity of a Trypanosome to Tsetse—*Trans Roy Soc Trop Med & Hyg* 1935 July 31 Vol. 29 No 2. pp. 203-206

Duke comments on CORSON's recent paper recording a remarkable instance of infectivity of *T. rhodesiense* in a reedbuck for *G. morsitans*

[this *Bulletin* 1933 Vol. 32, p. 709]. Evidence was obtained many years ago by Duke (1912) suggesting that residence in antelope (both buck and reedbuck) resulted in an increased infectivity of a strain to tsetse. More recent work has, however shown that even long antelope prolonged residence in one and the same host tends to weaken or even destroy altogether the power of a strain to infect fly. An example of this is cited [Duke this *Bulletin* 1933 Vol. 30, p. 78, and 1933 Vol. 32, p. 690].

In any discussion on the infectivity of trypanosomes to tsetse one should not ignore the possibility of the occurrence in the vertebrates of a cycle of development, the phases of which are definitely related to the behaviour of the trypanosome in the intermediate host. Mr. ROBERTSON (1912) first drew attention to this possibility and stated that the trypanosomes in the blood of the vertebrate host vary from day to day in their infectivity to tsetse. Duke believes that the evidence which has accumulated since Robertson's work is on the whole confirmatory.

Duke then passes to a consideration of Coxsackie's results in light of this view. Coxsackie concluded that the special suitability of the reedbuck's blood affords the best explanation of his phenomenal figures. Duke agrees inasmuch as the blood of antelope affords optimal conditions to the trypanosome of this species but he does not believe that the reedbuck is peculiar in this respect. He thinks it likely the same phenomenon will be found to occur in other species of tolerant antelope.

The article concludes as follows —

As to whether the trypanosome has undergone a selective change, I believe that in a tolerant species of antelope *T. schiediana* will manifest its maximum transmissibility restore it to a sensitive host, i.e. one that succumbs rapidly to the trypanosome, and the transmissibility will diminish either at once or after a few passages in that species of animal. But even in the antelope, after a time transmissibility will, I believe, diminish. This is at all events clearly indicated by my own experiments. It will therefore be of interest to learn whether the animal mentioned in this paper maintains anything like the high infectivity suggested by the two tests we have been considering.

II'

ROUAUD (E.) Les modalités atypiques de l'infection trypanosomienne cyclique chez les glossines. [Atypical Examples of Cyclical Infections of Trypanosomes in Glossina.]—Ann. Inst. Pasteur 1935. Sept. Vol. 55. No. 3. pp. 340-364. With 5 figs. [33 refs.]

This paper is concerned with an inquiry whether the three methods of cyclical development in *Glossina* adopted respectively by the *maculicornis*-*impressum* and the *gambiensis*-*rhodobaenus*-*barbarae* groups of trypanosomes are always absolutely constant, or whether deviations from the type may occur from time to time. With this object in view Rouaud has re-examined the records made by Bouyer and himself in 1910-1913 in the light of observations reported by later workers.

T. maculicornis—After giving a detailed account of the well-known labro-hypopharyngeal method of development of this group of trypanosomes in *Glossina*, Rouaud draws attention to a fact which is not generally recognized, viz.—that the time when metacyclic trypanosomes appear in the hypopharynx does not coincide absolutely

with that at which the fly becomes infective. If it is true to say that only those *Glossina* in which the hypopharynx is invaded are capable of transmitting the infection it is not true to say that invasion of the hypopharynx always and immediately renders the fly infective. This point is illustrated by reference to the report of Roubaud and BOUET from which it appears that the flagellates require a certain time to accommodate themselves to the insect medium before they can undergo that metamorphosis which is essential for the production of metacyclic forms.

Modifications of the type of salivary infection—DUKE (1933) has recently drawn attention to instances of spontaneous disappearance of infections in *Glossina*. He regards it as a rare phenomenon but Roubaud thinks that in the case of *T. ca. alboui* disinfection is far from exceptional. As far back as 1908 he noticed that the infection would disappear from the labial cavity in flies kept in captivity. These researches were continued in Dahomey and showed that as the result of age and as the result of hygrometric conditions different from those which were met with by the fly in nature the infection of the proboscis could be considerably modified. It appears that although under good conditions the fly may remain infected during the whole of its life the infection may disappear more or less completely in flies withdrawn from their normal environment. The most customary state met with in this partial disinfection is that in which the labial infection has disappeared completely whilst the hypopharyngeal infection remains. Examples are given of *G. palpalis* in which only a hypopharyngeal infection was found. One fly which died 111 days after its infecting meal showed exclusively small crithidial forms in the labial cavity—the hypopharynx was sterile. This fly had, however, fed on a goat the day before the death of the animal and became infected in due course. It appears therefore that during its last meal the metacyclic infecting forms had been completely discharged from the hypopharynx.

Experiments are recorded which were devised with the object of ascertaining the effect of atmospheric humidity on the infectability of *G. palpalis* with *T. caelabou*. The results indicate that keeping the flies either in a saturated atmosphere or in a dry atmosphere exercised an unfavourable influence the proportion of flies becoming infected under these conditions being much less than of those kept under normal conditions at a humidity of about 70 per cent. Further work showed that when flies were accustomed to a dry atmosphere for a prolonged period before the infective feeds the subsequent inhibiting effect of the dry atmosphere was much less than in unacclimatized flies.

From this work it appears that the degree of atmospheric humidity—especially dry conditions—exercises a definite influence on the type of infection the metacyclic forms may not appear or their development may be much retarded the crithidia may disappear and the infection become localized for a short time in the hypopharynx presaging a final extinction of the infection.

Similar observations on the loss of infection of the proboscis under unfavourable external conditions were made by BOUET and Roubaud (1911) on *G. morsitans* in the northern part of Dahomey and in Nigerian Sudan during the dry season. Immediately after capture 40 per cent of *G. morsitans* were found to be infected with *T. caelabou* whilst after keeping in captivity for 20 to 30 days only 2 of 13 flies were

found infected. Other similar examples are cited. It was noticed that the hygrophilic species *G. palpalis*, *G. tachinoides* and *G. longipalpis* were undoubtedly more affected by desiccation of the atmosphere than the more xerophilic species such as *G. morsitans*.

TAYLOR showed that the evolution of *T. gambiense* in *G. tachinoides* was greatly influenced in a favourable direction by high temperature. Roubaud records an observation made by him in Dahomey in 1911. In this case no evidence was forthcoming that high temperature assisted the development of *T. carabonis* in *G. palpalis*.

DUKE (1921) advanced the hypothesis that the kind of blood ingested by *Glossina* influenced the capacity of trypanosomes (*T. gambiense*) to develop in them. Flies nourished on reptilian blood, after the preliminary infecting meal exhibited a smaller proportion of infections than did those fed on monkeys. Roubaud (1913) nourished *G. palpalis* which had had an infecting meal on goats infected with *T. carabonis* on birds and on reptiles but did not observe any unfavourable effect on the development of the trypanosomes.

Roubaud gives reasons to believe that infections limited to the hypopharynx really represent the terminal stage of an infection which is on the way to extinction.

T. dimorphon-congoense—After describing the typical mode of development of this group of flagellates in *Glossina*, Roubaud asks whether modifications are ever encountered. He records that he found a *G. longipalpis* in Dahomey with an infection of *T. dimorphon* entirely limited to the proboscis. LLOYD and JOHNSON (1923-24) observed progressive disinfection of the digestive tube of *Glossina* in immature infections of *T. congoense*. It seems that this infection once established in the proboscis persists during the life of the fly. The digestive infection may disappear leaving the salivary infection intact as Roubaud himself has shown when the flies are nourished on animals treated with arsenicals. DUKE (1913) has observed the same thing in the case of *T. brucei* and *T. gambiense*. But we have not much information that the same thing can happen under natural conditions. Roubaud observed in a *G. longipalpis* in Dahomey a complete infection of the proboscis with *T. dimorphon*; the pharynx, proventriculus and anterior intestine were completely negative, but at the termination of the midgut the remains of a culture of trypanosomes was found. This was apparently a case of advanced disinfection of the gut with an intact salivary infection. Another *G. tachinoides* showed a feeble infection of the digestive tract 47 days after the infective feed; the proboscis was completely negative. This might be an example of spontaneous regression of an anterior infection, but it is equally possible that certain flies may have a reduced infection of the gut for their whole life without ever developing an anterior infection. Miss ROBERTSON and later VAN HOOF and HENRARD have made somewhat similar observations with *T. gambiense* and other trypanosomes, suggesting that the flagellates may multiply in the gut of the fly without ever extending to the salivary tract. A progressive and total disinfection of the digestive tube, leaving intact the salivary infection, is more difficult to understand, at least in the case of flies fed under normal conditions.

In so far as the trypanosomes of man are concerned there are on record a number of cases (DUKE, 1933; VAN HOOF and HENRARD, 1934) in which the infection was exclusively salivary and the intestinal tube was completely negative. Possibly these were the result of

sterilization of the gut infection but in the case of the *T. congolense* infection at least there is nothing against the hypothesis put forward by Roubaud in 1909 that the salivary infection established itself directly and immediately without being preceded by a gut infection. Whether the salivary infection is ever lost cannot yet be regarded as settled.

T. pecaudi—BOUET and Roubaud have shown that the evolution of this trypanosome in *Glossina* is similar to that of the group *T. dimorphon-congolense*. DUKE (1921) expressed doubt on this statement and especially regarding the site of the infection in the labial cavity and hypopharynx of *Glossina*. Roubaud writes that if *T. pecaudi* belongs to the same group as *T. brucei* it is curious that it does not invade the salivary glands which is so characteristic of the group *brucei-gambiense-rhodesiense*. LLOYD and JOHNSON (1924) have observed that the absence of flagellates in the proboscis in the development of the polymorphic group of trypanosomes has been insisted upon too strongly. The Luangwa Valley Commission (1912) recorded an instance of the heavy infection of the proboscis as well as of the salivary glands, of a *G. morsitans* infected with *T. rhodesiense*. LLOYD and JOHNSON in 7 cases (2 of *T. gambiense* and 5 of *T. brucei*) observed trypanosomes of the proventricular type in the proboscis. In the course of Roubaud's work with BOUET invasion of the proboscis of *Glossina* infected with *T. pecaudi* was noted in 4 of 4 cases in which the infection was confirmed by experimental inoculation. In 2 cases proventricular forms or crithidia were either fixed to the labrum or free in the labial cavity whilst metacyclic forms were found in the hypopharynx. In the other 2 cases infection of the labrum was not observed there was a total infection of the gut up to the pharynx and an infection of the hypopharynx. Roubaud believes that this state of things indicated an old infection in which that of the labial cavity had disappeared.

Invasion of the salivary glands by this trypanosome was not seen but Roubaud considers that it may possibly occur but only as a secondary phenomenon. An essential fact is that the forms seen in the proboscis were capable of producing infection of the vertebrate host. DUKE (1933) observed that BRUCE was unable to confirm the observation made by the reviewer and his colleagues (1912) viz. that forms infective for the vertebrates were present in the gut of *G. morsitans* infected with *T. rhodesiense*. BOUET and Roubaud had however made a similar observation in the case of *T. pecaudi*. [The section of this paper dealing with *T. pecaudi* is especially interesting as it seems to have been generally accepted for many years that *T. pecaudi* is synonymous with *T. brucei*. If what is written above is correct then apparently *T. pecaudi* cannot be identical with *T. brucei*.] W Y

PERUZZI (Mario) Polimorfismo e trasformazioni globulari di alcuni tripanosomi africani nei loro rapporti con la patologia. [Poly-morphism of Certain African Trypanosomes in regard to their Pathology]—Pathologica 1935 Sept. 15 Vol. 27 No. 527 pp 577-586 With 3 text figs. & 24 figs. on 2 plates. [14 refs.] English summary

The author states that the long thin forms of the *brucei* group with drawn out nucleus compact and staining well, are the typical

forms which invade the host and maintain the species. The six manifestations of polymorphism appear with defects or anomalies of division and unequal distribution of the nuclear and kinetoplastid elements—the leishmanial, crithidial and leptoconoid forms, he states, are derived from intermediate short forms. Anomalous forms are present in abundance in inflamed areas, in serous exudates, and it is of such that phagocytosis occurs. In the author's summary he maintains that the polymorphism of the trypanosomes of the *brucei*-*rhodesiensis*-*gambiense* group appears to be a morphological expression of anomalies of the development of the strain giving rise to atypical torpid beings incapable of further multiplication and destined to destruction by phagocytosis. The globular forms arise from these anomalous forms. Both these represent degenerated individuals in which the strain shows a tendency to exhaustion after rapid multiplication in the vertebrate host and it is towards these that the first indications of exudative and tissue reaction are observable. [The article contains some (not very convincing) figures.]

H H S

POINDEXTER (Hildrus A.) Further Observations on the Relation of Certain Carbohydrates to *Trypanosoma equiperdum* Metabolism.—*Jl Paratology* 1935 Aug Vol 21 No 4 pp. 292-301.

As the result of previous work (this *Bulletin* 1934 Vol. 31 p. 594), the author concluded that the fermentable carbohydrates of the blood form an essential part in trypanosome metabolism. The present paper describes *in vivo* and *in vitro* experiments devised with the object of investigating this hypothesis further.

The conclusion reached is that the fermentable carbohydrates seem to exert an important influence on the rate of multiplication, survival time, and virulence of trypanosomes. Injection of insulin which decreases the blood sugar likewise decreases the rate of multiplication of trypanosomes, and prolongs the life of the host. It was noted that less insulin was required to produce a shock as the course of the infection progressed; this corresponded with the decrease in the amount of available fermentable carbohydrate in the blood and to the liver damage.

W I

CULMARRISON (James T.) Trypanocidal Action of Normal Human Serum.—*Arch. Pathology* 1935 Nov Vol 20 No 5 pp. 787-790 [111 refs.]

This article gives an excellent review of the present position of knowledge regarding the trypanocidal substance in normal human serum. All the main papers dealt with have already received notice in this *Bulletin*. At the end the author gives a summary of the chief points discussed, and this is reproduced here for the benefit of those who have not followed recent advances in knowledge of the subject.

The normal serum of man will destroy the trypanosomes pathogenic for animals (*e.g.* *T. brucei*, *T. equiperdum*, *T. equinum*, etc.) either in the test tube or in the body of rodents infected with these parasites. Human serum does not affect the trypanosomes pathogenic for man (*T. gambiense*, *T. rhodesiensis* or *T. cruzi*) the common trypanosome of rats (*T. lewisi*) or a trypanosome of newts (*T. dasyproctini*). One of the human trypanosomes, *T. rhodesiensis* is distinctive in that it becomes susceptible to the action of human serum after it has been passed successively through mice. The serum

of no other animals excepting certain monkeys manifests trypanocidal activity. The serum of some monkeys however, e.g. that of the baboon, destroys not only the trypanosomes pathogenic for the lower animals but, as well those infective for man.

The trypanocidal substance of human serum is found in the globulin fraction of the serum. It is thermolabile being destroyed wholly when the serum is heated at 64°C for an hour and being reduced rapidly when the serum is let stand at room temperature. The trypanocidal substance passes readily through Berkefeld filters and with diminished intensity through collodion ultrafilters. It is removed from a serum by absorption with trypanosomes or bacteria (the typhoid bacillus *Proteus*). The substance exhibits its activity independently of all the known components of alexin. The essential substance in the human serum which brings about the trypanocidal effect is antigenic and a specific anti trypanocidal antibody develops in rabbis repeatedly treated with an active serum.

The trypanocidal substance probably originates in the normally functioning healthy liver. It is found in the blood serum and in serous exudates. The cerebrospinal fluid and the urine are without trypanocidal power. The substance appears in infants at a very early age and may be present at birth. It is probably elaborated within the body of the young child since it is found neither to pass the placenta nor to occur in human milk. The trypanocidal power is enhanced in women late in the period of gestation and is maintained at a high level for some time after delivery.

It seems unlikely that the action of the trypanocidal substance is that of an opsonin or an agglutinin, and the property is manifested wholly without the intervention of alexin. Some investigators have felt it acts essentially as a chemotherapeutic substance. Susceptible strains of trypanosomes become resistant or fast to human serum after repeated exposure to the serum in a manner comparable to that in which they become resistant or fast to drugs.

Since human serum affects only those species of trypanosomes which are pathogenic for animals and which are noninfective for man and is without effect on the trypanosomes which are infective for man, it is by some believed that the trypanocidal action of the serum is responsible for man's immunity to the animal pathogens. It is known however that strains of animal trypanosomes which have been rendered serum fast still are noninfective for man and that strains of human trypanosomes (*T. rhodesiense*) which become susceptible to human serum after repeated passage through animals retain their infectivity for man. Furthermore the serum resistant parasite *T. lewisi* which is wide-spread among rats is apparently unable to infect man. The serum of patients with trypanosomiasis is as active in trypanocidal power as that of normal persons. It appears therefore that the immunity of man to the animal trypanosomes depends on factors other than the trypanocidal activity of the serum.

The trypanocidal activity of human serum is sharply reduced in diseases which cause extensive destruction of the parenchyma of the liver. Less conclusive evidence of alteration in the potency of the substance has been offered in other infectious diseases (e.g. tuberculosis and syphilis) and in those attributable to deficiencies in accessory food factors. No significant reduction is observed in human trypanosomiasis. It seems possible from the observations of some workers that the carrier condition in hemophilia can be identified by the absence of the trypanocidal substance from the serum.

It appears not unlikely that trypanosomes are but one form of infectious agent on which a single destructive entity in human serum acts. The fact that both the trypanocidal and bactericidal substances are removed from the serum by absorption with either trypanosomes or bacteria points toward a close similarity between the trypanocidal and bactericidal powers. The trypanocidal activity however differs from the bactericidal property and resembles the virus-neutralizing function of human serum in being limited to the serum of man and a few closely related primates and in

occurring without the presence of alexin. If further study indicates that these effects are all manifestations of a single entity of the serum or what seems more likely that they arise in analogous manners, support for the assumption that these "anti-substances" arise by immunization through contact with the specific antigen is difficult to maintain, since at no time in life does the average person suffer subclinical or abortive infection with trypanosomes."

W. J.

ROBERTSON (Andrew). The Reticulocyte Response in Mice, Rats, Guinea-Pigs and Monkeys infected with *Treponema pallidum*, *Trypanosoma gambiense* and *Plasmodium knowlesi*.—Jl. Trop. Med. & Hyg. 1935 Oct 1 Vol. 38. No. 19. pp. 237-241. With 4 charts. [16 refs.]

The technique adopted was the usual one of mixing a drop of blood on a prepared slide covered with a dried film of brilliant cresyl blue. In each instance 1,000 red cells were observed (using a squared eyepiece) and the reticulocytes were expressed as a percentage. When spirochaetes or trypanosomes were present they were counted at the same time as the reticulocytes and the number per 1,000 red cells noted.

The author gives the following summary of his observations—

(1) Reticulocytes in mice at the first examination were found to vary from 2.2 to 12.7 per cent. average 3.49. The majority however had reticulocytes from 2 to 5 per cent.

"(2) Subjected to small daily bleedings there was a rise in the reticulocytes beginning about the third or fourth days and continuing up to from eight to fifteen days from the start of the examinations.

(3) The average reticulocyte level in the mice over a period was between 3.5 and 4.5 per cent.

"(4) A marked reticulocyte response was observed after inoculation of the mice with *Treponema recurvirostris* (Yellow). This began about four days after the first appearance of spirochaetes in the blood and reached its maximum four days after the maximum was attained by the organisms. The maximum reached was 36 per cent. reticulocytes.

"(5) After recovery the average reticulocyte level tended to be slightly lower from 2 to 4 per cent. than previous to inoculation.

"(6) Older adult rats did not show a marked response to daily bleedings nor did their reticulocytes tend to show such variations from day to day as were seen in younger rats. The former averaged 2.65 per cent. while the latter was from 2 to 10 per cent. The younger adult rats had a reticulocytosis from 15 to 20 per cent. starting about the fifth day as a result of the bleeding.

"(7) Four young rats recovered from an infection with *T. cruzi* did not show a definite reticulocyte increase to [—at] the daily examinations and after being under observation for seventeen days their reticulocytes fell to and were maintained at a lower level. It is suggested that the disease had lessened the regenerating powers of the bone-marrow as it were had produced an aplastic condition.

"(8) In guinea-pigs under conditions of daily blood examinations the reticulocytes are probably between 0 and 2 per cent.

"(9) When rats were inoculated with *T. gambiense* there was a reticulocytosis which was cut short owing to the swarming of the animal with trypanosomes. This rise in reticular cells followed the trypanosome increase after an interval of two to four days.

"(10) If drug treatment was administered (Bayer 203 0.01 mgm. per gm. body-weight) at the height of the trypanosome infection the reticulocytosis continued for from seven to eighteen or nineteen days and usually reached its maximum about the fourth or fifth day.

(11) After this maximal reticulocytosis the reticulocytes tended to return to a level comparable to that observed before infection. Later after about sixty days from inoculation, the trypanosomes again appeared and multiplied rapidly. This terminal rise of trypanosomes was paralleled by a reticulocytosis similar to that seen in untreated rats.

(12) With *T. lewisi* infections the reticulocytes of young adult rats showed a response which closely followed the daily curve of the number of trypanosomes without the delay seen in *T. gambiense* infections. After the trypanosomes had disappeared finally from the blood there was a second reticulocytosis which graphically formed a plateau.

(13) The bone-marrow from mice rats and guineapigs with spirochaetosis and trypanosomiasis showed a microcytic increase.

(14) The reticulocytes in *Silenus rhesus* are probably from 0 to 2 per cent. when examined daily over a prolonged period.

(15) With malaria (*P. knowlesi*) the reticulocytes tend to maintain a higher level. When atebriin is given in doses insufficient to cure the infection the maximal reticulocytosis may be delayed.

(16) Malarial parasites of monkeys as a rule were found not to occur in reticulocytes.

(17) The anaemias of experimental trypanosomiasis and spirochaetosis in mice rats and guinea pigs and malaria in monkeys when severe may result in the appearance of megalocytes but the anaemia is essentially microcytic or hypochromic in character.

(18) There was some correlation between the number of organisms spirochaetes and trypanosomes and the extent of the reticulocyte response.

(19) It is suggested that the anaemia of spirochaetosis and trypanosomiasis is due to increased erythrolysis and further as evidenced by the reaction in treated rats to the terminal rise of trypanosomes that proof has yet to be adduced of any inhibitory effect of the organisms on the bone-marrow activity.

W Y

FRENCH (M. H.) Nitrogen and Mineral Metabolism in *T. congolense* Disease—Tanganyika Territory Ann Rep Dept Vet Sci & Animal Husbandry 1934 Part V—Research. pp 59-64

From the work described in this article it was concluded that infection with *T. congolense* results in an increased rate of excretion of nitrogen calcium potassium and phosphates. Magnesium balances are apparently not disturbed. The effect on sodium and chlorine metabolism appears to be dependent upon the level of intake on an adequate consumption retention follows but a negative balance results on low intake.

W Y

VAN DEN BRANDEN (F.) La réaction de Fulton ou méthode au chlorure mercurique chez les rats infectés de *Trypanosoma congolense* ou de *Trypanosoma brucei* [Fulton's Reaction in Rats Infected with *T. congolense* or *T. brucei*]—Ann Soc Belge de Méd Trop 1935 Sept. 30 Vol. 15 No 3 pp 397-398

Fulton's reaction or the mercuric chloride test was employed by HORGAN BENNET and KIRNY (1929) in the diagnosis of trypanosomiasis among camels. The test consists in the addition of a drop of the serum of the suspected animal to solutions of mercuric chloride varying in strength from 1/10 000 to 1/100 000. The authors concluded that the serum of healthy animals is precipitated by the stronger solutions only 1/10 000 to 1/20 000. Precipitation with intermediate strengths, 1/40 000 to 1/60 000 indicates that the case is probably one of trypanosomiasis whilst precipitation with the weakest solutions 1/80 000 and 1/100 000 warrants a positive diagnosis.

As the work of later investigators had cast some doubt on the specificity of the reaction van den Branden decided to examine the test with the serum of normal rats and of rats infected with *T. congolense* or *T. brucei*. In his earlier experiments he employed solutions of mercuric chloride of the strengths mentioned above. These, however proved to be useless, as with only the strongest solution (1/10,000) was a precipitation observed. With this solution 4 per cent. of the normal sera gave positive results 30 per cent. of the sera from *T. congolense* rats, and 33 per cent. of the *T. brucei* rats.

In later experiments he employed concentrations of mercuric chloride varying from 1/1,000 to 1/32,000. His results were—

Of the normal sera 100 per cent. gave positive results with a concentration of 1/8,000; of the infected rats 100 per cent. gave positive results with a concentration of 1/16,000.

The conclusion reached is that Fulton's reaction is not sufficiently specific to be of value in the diagnosis of *T. congolense* and *T. brucei* infections of rats.

W.F.

VAN SAECHTEL (René). Sur le diagnostic des infections dues à "Trypanosoma vivax" chez les bovidés. [The Diagnosis of *T. vivax* Infections in Cattle].—Bull. Agric. Congo Belge, 1935, Mar. Vol. 26, No. 1, pp. 152-154. With 1 fig.

The author states that the best way to discover *T. vivax* in infected cattle is by gland puncture—the gland juice is often positive when the blood is negative.

W.F.

SCHLOSSBERGER (H.) & GRILLO (J.). Experimentelle Untersuchungen über Misch- und Sekundärinfektion. VI. Mitteilung. Weitere Versuche über den Einfluss einer Mischinfektion mit Relapsing-spirochäten auf die trypanotode Wirkung des Germanin. [Further Experiments on the Influence of a Mixed Infection with Relapsing Fever Spirochaetes on the Trypanocidal Action of Germanin].—Zent. f. Bak., I. Abt. Orig. 1935, Nov. 15, Vol. 135, No. 4/5, pp. 203-215.

After contrasting the course of mixed infections of *T. rhodesiense* and various spirochaetes in mice with that of the trypanosome infection alone the authors compared the effect of germanin on such mixed infections with its action on the pure trypanosome infection.

A series of mice were infected at the same time with *T. rhodesiense* and one of the following spirochaetes—*Sp. hispanica*, *Sp. obermanni*, *Sp. duttoni*, *Sp. novyi*, *Sp. schubertiana*, *Sp. crocidurae*, *Sp. tenacis A*, and *Sp. tenacis B*. The course of such mixed infections is shown in a table, from which it is seen that the *Sp. tenacis A* and *B* did not influence the *rhodesiense* infection, but that the other spirochaetal strains to a varying degree exerted an inhibitory action on the trypanosomal infection—sometimes this action was quite pronounced, whilst in other cases it was very slight. The authors came to the conclusion that the effect on the trypanosomes depended less on the particular spirochaetal strain employed than on the clinical course of the relapsing fever. The best action was observed in those individuals in which the attacks were short and the intervals long.

Whilst $\frac{1}{100}$ gm. of germanin per 20 gm. is a certainly curative dose in simple nagana infections of mice in mixed infections of nagana and *Sp. hispanica* such a dose will only cure if it is given in the first

3 days. If however the drug is given on the first day of a mixed infection definitely smaller doses are curative e.g. 100 gm and 100 gm and even less.

The authors record experiments which confirm the observations of JANCSÓ [this *Bulletin* 1935 Vol. 32 p. 702] that blockade of the reticulo-endothelium lessens the therapeutic action of germanin. According to HASSKÓ the smaller curative action of germanin in mixed infections is due to the injury to the reticulo-endothelial system caused by the spirochaetes. The increase in the action of the drug at the commencement of mixed infections is probably the result of a two-fold action. Firstly the greater portion of the trypanosomes are killed by the chemotherapeutic action of the drug and the capacity of the remainder to multiply is inhibited. Secondly after a relapsing fever crisis, there is hyper-regeneration of reticulo-endothelium and a consequent increase in the power of the host to deal with the trypanosomes which remain

W Y

GRILLO (Joaquin) & SCHMITZ (Joachim) Chemotherapeutische Versuche bei mischinfektionen mit zwei Trypanosomenarten [Chemotherapeutic Experiments on Mixed Trypanosome Infections.]—*Ztschr f Immunitätsf u Experim Therap* 1935 July 29 Vol. 85 No 3/4 pp 203-217 [18 refs.]

Experiments here described were undertaken in order to ascertain whether the infection of rats and mice with two different species of trypanosomes in any way modified the response of the parasites to various drugs.

The double infection of rats with *T. lewisi* and *T. brucei* did not result in any obvious reciprocal influence on the infections each developed in the usual way after the usual incubation period. The natural resistance of *T. lewisi* to germanin was in no way influenced by the presence of the nagana infection nor was the sensitiveness of *T. lewisi* to the arseno-antimony-benzole derivative Sdt 355 increased.

Mixed infections of white mice with *T. brucei* and *T. equiperdum* ran the usual course of single infections and the two parasites exerted no reciprocal effect on one another.

A strain of *T. brucei* rendered blepharoplastless by exposure to repeated small doses of acriflavine exhibited a definite resistance to acriflavine but the usual sensitiveness to germanin. The dose of germanin required to cure mice with a double infection of *T. brucei* and *T. equiperdum* was the same as that necessary to cure single infections with either of these trypanosomes.

W Y

BARLOVATZ (A.) La réaction méningée atoxyllique. [The Atoxylle Meningeal Reaction.]—*Bull. Soc Path. Exot.* 1935 Nov 18 Vol. 28. No 9 pp 823-828

In the course of his work on sleeping sickness Barlovatz has studied the rapid reaction seen in changed cerebrospinal fluids (especially the protein content) immediately after the first injection of the drug in previously untreated patients. The author is in the present paper concerned with this initial change alone. The vast majority of his observations have been made after a dose of one of the following four drugs—

Tryparsamide (tryponarsyl) 2-3 gm. Atoxyl (trypoxyl) 0-6-1 gm. Bayer 205 (moranyl) 0-8-1 gm. Tartar emetic 0-08-0 1 gm.

Sometimes these doses were repeated after an interval of a couple of days. Lumbar puncture was made on the day of injection and at latest a week afterwards.

The immediate results produced by an injection of the various drugs is summarized in the following table —

	Leucocytosis	Albumen content
Tryparsamide (intravenous)	sudden fall	slow fall
Atoxyl (subcutaneous)	rise or plateau	rise
Bayer 205 (intravenous)	..	plateau
Tartar-emetic (intravenous)	slight fall	plateau

Tryparsamide is thus followed by a rapid fall in the number of leucocytes in the spinal fluid — within a few days the figure may reach one-third or less. During the following weeks there is the usual increase but it is less formidable. The albumen content is much more stable than the leucocytosis and responds more slowly. It reacts, however, to atoxyl by a sudden and massive increase, which is the chief characteristic of the atoxyl meninginal reaction. The leucocytes usually show at first a moderate increase, but they may also rise rapidly.

The above is the general rule, but actually variations occur. The meninginal reaction may follow tryparsamide, but this is quite exceptional and happens in less than 1 per cent. of cases — and it occurs in only about 5 per cent. of cases treated with germanin or tartar emetic. With atoxyl the reaction is sometimes very slight and it may fail altogether but with this drug it is the rule rather than the exception.

Details are given in tabular form of 4 patients treated with atoxyl —

Names	No. of days between the two examinations	Leucocytes		Albumen	
		Before	After	Before	After
Kasambala	{ (lumbar puncture) 7	150	163	0.40	0.42
	{ (occipital puncture) 6	130	120	0.30	0.44
Tahespa	{ (lumbar puncture) 8	210	215	0.44	0.51
	{ (occipital puncture) 10	130	120	0.4*	0.47
Malenda	{ (lumbar puncture) 7	155	830	0.35	0.33
	{ (occipital puncture) 7	4*	30	0.39	0.33
Beya	(lumbar puncture) 6	13	30	0.15	0.27

The general conclusion is that atoxyl often provokes, in the already changed spinal fluid of sleeping sickness cases, an increase of leucocytes and of albumen — the increase is sudden and sometimes important. This meninginal reaction is not seen with the other three drugs, viz. tryparsamide, germanin and tartar emetic.

VAN DEN BRANDEN (F.) & AFFELMANS (M.). Les troubles visuels au cours du traitement de la trypanosomiase humaine par la tryparasamide (tryponarsyl, trypotan, novatoxyl). [Visual Disturbances in the Course of Treatment of Human Trypanosomiasis by Tryparsamide.]—Bruxelles M&M. 1935 Oct. 20 Vol. 15 No. 51 pp. 1405-1421 [51 refs.]

Much of the work referred to in this paper has already been published elsewhere and summarized in this Bulletin [1934 Vol. 31 p. 573].

Attention is drawn to the fact that visual disturbances are met with in no less than 20 per cent. of second stage cases of human trypanosomiasis treated with tryparsamide. These accidents are serious because they involve both eyes and frequently lead to blindness as the result of bilateral optic atrophy. After considering the clinical characters of these visual troubles the authors attempted to reproduce them in the rabbit with the object of throwing light on their pathological mechanism.

BROUARD and POUCHET who have studied the poisonous effects of inorganic compounds of arsenic have not noticed sensory disturbances. Acute poisoning produces choleric symptoms—epigastric pain, vomiting, diarrhoea, aphonia and muscular cramps—death occurs on the third to fifth days with delirium and convulsions. Chronic poisoning develops in 4 periods—the first is characterized by digestive disturbances—the second is marked by cutaneous eruptions—erythemas, exfoliations, pigmentations, urticaria—notably of the eyelids and by laryngo-bronchial catarrh (sometimes aphonia) extending to the mucous membrane of the nose and conjunctiva. The third period is characterized by disturbances of sensation—numbness of the limbs, shooting pains—and in the fourth period palsies develop and the patient is easily fatigued. Cure is frequent but convalescence is protracted—death when it occurs is due to lesions of the heart, liver and kidneys. Visual troubles following poisoning by inorganic arsenicals are very rare and quite different from the amblyopia due to aromatic arsenicals—a large dose of an inorganic arsenical may produce a central scotoma with great loss of vision and haemorrhages of the retina, but these troubles tend to disappear when the intoxication ceases.

Numerous cases of blindness have been recorded during the treatment of various diseases by pentavalent aromatic arsenicals such as acetylarsan, stovarsol and particularly atoxyl and tryparsamide. The amaurosis produced by atoxyl is the gravest of the toxic amblyopias—when visual troubles proclaim themselves they almost always lead to blindness from optic atrophy. Visual disturbances have been frequently observed during the treatment of trypanosomiasis with tryparsamide by PEARCE, CHESTERMAN, MARUGO, LAIGRET etc. The authors have observed them 24 times in 118 cases. Details of these cases are summarized in a table and are discussed at some length [this *Bulletin loc. cit.*] From the clinical facts recorded in this part of the paper the following conclusions are drawn—

1. In poisoning by inorganic arsenicals visual troubles are rare and late. The symptoms and evolution are quite different from those observed in the course of a treatment with atoxyl or tryparsamide and they are reversible.

2. The visual disturbances following treatment of trypanosomiasis with tryparsamide are frequent—they often occur early in the treatment and are only partially reversible.

3. These troubles occur almost exclusively in second stage cases of trypanosomiasis where the spinal fluid is changed—they are the more frequent as the spinal fluid is the more changed.

The next portion of the paper describes experiments undertaken with the object of producing optic changes in rabbits analogous to those seen in man. Van den Branden has already shown that when rabbits are given large doses (1.25 gm. per kilo) of tryparsamide they develop renal lesions [this *Bulletin* 1935 Vol. 32 p. 695]. So

Sometimes these doses were repeated after an interval of a couple of days. Lumbar puncture was made on the day of injection and at latest a week afterwards.

The immediate results produced by an injection of the various drugs is summarized in the following table —

	Leucocytosis	Albumen content
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Tryparsamide is thus followed by a rapid fall in the number of leucocytes in the spinal fluid. Within a few days the figure may reach one-third or less. During the following weeks there is the usual increase but it is less formidable. The albumen content is much more stable than the leucocytosis and responds more slowly. It reacts, however, to atoxyl by a sudden and massive increase, which is the chief characteristic of the atoxyllic meninginal reaction. The leucocytes usually show at first a moderate increase, but they may also rise rapidly.

The above is the general rule but actually variations occur. The meninginal reaction may follow tryparsamide but this is quite exceptional and happens in less than 1 per cent. of cases and it occurs in only about 5 per cent. of cases treated with germanin or tartar emetic. With atoxyl the reaction is sometimes very slight and it may fail altogether but with this drug it is the rule rather than the exception.

Details are given in tabular form of 4 patients treated with atoxyl —

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	(occipital puncture) 6	130	130	0.30	0.44
Tahisupa	(lumbar puncture) 8	210	215	0.44	0.51
	(occipital puncture) 10	130	120	0.42	0.57
M. Ionda	(lumbar puncture) 7	155	820	0.35	0.55
	(occipital puncture) 7	42	720	0.39	0.53
Boya	(lumbar puncture) 6	13	20	0.15	0.27

The general conclusion is that atoxyl often provokes, in the already changed spinal fluid of sleeping sickness cases, an increase of leucocytes and of albumen the increase is sudden and sometimes important. This meninginal reaction is not seen with the other three drugs, viz. tryparsamide, germanin and tartar emetic.

W.Y.

VAN DEN BRANDEN (F.) & APPELMANS (M.). Les troubles visuels au cours du traitement de la trypanosomiasis humaine par la trypar-samide (tryponarsyl, trypotan, novatoxyl). [Visual Disturbances in the Course of Treatment of Human Trypanosomiasis by Tryparsamide.]—*Bruxelles Méd.* 1935 Oct. 20. Vol. 15. No. 51 pp. 1405-1421 [51 refs.]

Much of the work referred to in this paper has already been published elsewhere and summarized in this *Bulletin* [1934 Vol. 31 p. 573].

infected with nagana are given in a table and contrasted with those of various salvarsans. It is seen that the arsenic content is relatively very low. The drugs were administered intravenously subcutaneously and orally. Four of the compounds (W VI W VII W XI and W XII) showed a therapeutic index which surpassed that of neosalvarsan. The best was W VII on intravenous injection with an index of 1.45. On oral administration they gave good results. Rabbits in an advanced stage of the disease were cured. Certain of the compounds (W VII W VIII, and W XI) proved superior to salvarsan in the treatment of *Sp. recurrentis* infections of white mice.

W Y

HORNBY (H. E.) On the Nature of the Resistance to Treatment shown by Some Cases of Bovine Trypanosomiasis.—Tanganyika Territory Ann Rep Dept Vet Sci & Animal Husbandry 1934 Part V—Research. pp 37-39

Antimosan and tartar emetic still remain the standard remedies for infections due to *T. congolense* and *T. vivax*. All work on this subject suggests that the action of the two drugs is identical, and that if an infection is able to resist the action of one it is likewise able to resist the other. Of great importance to veterinarians are the researches of YORKE and his colleagues on drug-resistance. They showed that while it is extremely difficult, or even impossible to produce a tartar emetic resistant strain by the ordinary direct method of administering sub-curative doses of the drug it is extremely easy to produce a resistant strain from an atoxyl-resistant strain. They also showed that resistance to naganol (Bayer 205) does not involve resistance to antimonial compounds. It would appear therefore that so long as we refrain from using arsenical drugs prior to antimoniais there is no danger of establishing antimony resistant strains. Nevertheless, in practice some cases of trypanosomiasis seem to be incurable by antimoniais, and the question arises whether this is due to idiosyncrasy of the host or wholly or in part to a treatment-resistant character of the particular strain of parasite. It was with the object of finding an answer to this question that the present work was undertaken.

Details are given of a buffalo infected with *T. congolense* which proved highly resistant to antimoniais. The animal had to be destroyed as incurable on 30th January 1933 after having received 34 injections of antimosan and tartar emetic between August, 1931 and January, 1933. A healthy animal was inoculated from this buffalo on 27th October 1931 and this animal became infected and was cured by two courses of tartar emetic.

An ox infected with *T. congolense* was treated unsuccessfully with many courses of antimosan and tartar emetic between August, 1932 and March, 1934. At a late stage of the infection in November 1933 a healthy ox was inoculated with the blood of this animal, and from this two other oxen were subinoculated both were quickly cured by antimosan or tartar emetic.

The general conclusion reached from this work is that unusual refractoriness to antimonial treatment is more often due to a host idiosyncrasy than to special resistance on the part of the parasite.

W Y

FRENCH (M. H.) & HORRBY (H. E.). Studies concerning the Effect of the Planes of Nutrition on the Course of Animal Trypanosomiasis. 1.—Introduction, and 2.—*T. congolensis* Disease from Infection to Crisis.—*Tanganyika Territory Ann. Rep. Dept. I et. Sci. & Agric. Husbandry 1934* Part V—Research. pp. 40-58. With 11 figs.

Experiments are described from which it is concluded that the course of *T. congolensis* disease from infection to crisis is uninfluenced by planes of nutrition higher than those of bare maintenance.

In their introduction, the authors point out that in tropical Africa the three trypanosomes of veterinary importance are *T. congolensis*, *T. vivax* and *T. brucei*. There are quite definite differences between the diseases due to these three parasites, e.g. *T. brucei* produces a blood disease in rats and guineapigs, whereas in rabbits and goats the most pronounced lesions are in the more solid tissues. *T. congolensis* however is essentially a blood parasite, and the disease due to it is essentially an anaemia. As *T. congolensis* is at least as important as the other two parasites, and as its behaviour within the mammalian host is better known the authors selected it for their first experiments. The experiments have been divided into two parts—the first dealing with the stage from infection to the crisis of impending death or commencement of recovery and the second with the period of recovery.

Although there are neither cattle nor donkeys, and comparatively few sheep, goats and dogs within the thick tsetse belts of East Africa, owing to the fatal effect of continual infection by pathogenic trypanosomes, yet any single infection by itself is by no means necessarily fatal. In fact HORRBY and BARLEY (1930) have stated the opinion that "uncomplicated disease due to a single infective dose is rarely fatal if a diet adequate to meet the calls of anaemia is provided."

Notwithstanding the fact that it is generally assumed that good feeding is essential to recovery from *T. congolensis* disease, there are no precise experiments on the subject or on the equally important question whether feeding influences the course of the disease in its earlier state. It is with the latter matter that the present paper deals. The experiments were conducted on 11 oxen of which two were uninfected controls. For details the paper itself must be consulted.

No indication was found that higher planes of nutrition exert a beneficial influence against the development of the disease. In all cases, whether good or poor rations were provided, the production of anaemia followed the same course nor was there anything to suggest that nutrition influences the degree of infection. Better feeding did not help the formation of antibodies, since neither body temperature nor the degree of infection was influenced by nutrition.

J. F.

ROTHMUND (M.) & RICHTER (R.). Experimentelles ueber Sohu-Salvarsan. [Experiments on Sohu-Salvarsan].—*Ztschr. f. Immunol. u. Experim. Therap.* 1935. Aug 30. Vol. 85 No. 5/6 pp. 474-487

Observations are recorded on the toxicity and therapeutic action of a new arsenobenzol derivative prepared by the I. G. Farbenindustrie under the name of sohu-salvarsan.

The drug is supplied in solution ready for use, and can be given either intramuscularly or intravenously. The solution is slightly alkaline and is of such a strength that 1 cc. contains 0.02 gm. of arsenic.

The toxicity of the freshly prepared substance and of the solution kept 30 days was tested on mice rats and guineapigs. For mice the toxic dose was from 0.3 to 0.5 cc. and the tolerated dose was 0.25 cc. per 20 gm. of body weight for rats the toxic dose was 5.0 to 7.0 cc. and the tolerated dose 4.0 cc. per kilo of body weight and for rabbits the doses on subcutaneous injection were respectively 3.0 cc. and 1.5 cc. per kilo of body weight. Similar results were obtained with solutions kept for 30 days no increase in toxicity being observed.

The therapeutic action of solu-salvarsan was determined in mice infected with nagana or Russian relapsing fever and in rabbits infected with syphilis. It was found that doses of 0.0125 cc. to 0.02 cc. cured nagana mice. In the relapsing fever mice 0.0125 cc. caused the disappearance of spirochaetes from the blood in 2 days and 0.025 cc. caused their disappearance within 24 hours. In experimental rabbit-syphilis the curative dose was 0.15 cc. per kilo

From this work it appears that solu-salvarsan exhibits a strong parasitoidal action and is less toxic than other arsenobenzol derivatives. The therapeutic index of solu-salvarsan for mice infected with nagana is 1.20 as compared with 1.40 for neosalvarsan but for mice infected with *Sp. obermeieri* the ratios are 1.10 for solu salvarsan and 1.2 for neosalvarsan. In the case of rabbit-syphilis the drugs are equally active.

The last part of the paper records a large number of prophylactic experiments made with solu-salvarsan and neosalvarsan. Mice were given various doses of one or other of the two drugs and then at daily intervals afterwards a certain number were inoculated with nagana. The length of protection conferred was about the same in each case and varied directly with the amount of drug given. When the dose approximated to the maximum tolerated dose the mice were protected for about 5 days.

W Y

YORK (Warrington) Contribution au côté biologique de la chimio-thérapie. [Contribution to the Biological Side of Chemotherapy]
—*Riv d' Malariologia* Sez. II 1935 Vol 14 Supp to No 3. pp 53-71 With 3 graphs.

In this lecture the author summarized the recent work of his colleagues and himself. The various matters dealt with have already been noticed in this *Bulletin*

W Y

BROWNING (C. H.) Chemotherapy—the Progress of Thirty Years and the Prospect.—*Glasgow Med Jl* 1935 Nov Vol 124 No 5 Chir pp 1-16

This lecture gives a general review of the progress of chemotherapy during the last 30 years. It contains nothing new and must be consulted in the original by those interested.

W Y

SCHILLING (Clara) with H SCHRECK H NEUMANN & H KUNERT Versuche zur Schutzwirkung gegen Tsutscherkrankheit. II Teil [Experiments on Protective Inoculation against Tsetse-fly Disease.]—*Ztschr f Immunitatsf u Experim. Therap* 1935 Aug 30 Vol 85 No 5/6 pp 513-528.

The work with which this paper deals has already been published elsewhere and noticed in this *Bulletin* [1935 Vol 32, p 714]

W Y

DUKE (H. Lyndhurst) Old "Laboratory" Strains of the Poly-morphic Trypanosomes.—*Lancet*. 1935 Sept. 21 pp. 665-667

This paper is apparently called forth by Browning and Gulbransen's recent communication regarding a strain of *T. brucei* passed in mice. In the early passages the infection was relatively chronic and relatively resistant to arsenicals, whilst in the later passages it was relatively virulent and the infected mice were readily cured by the same drugs. [This general fact has, of course, been known for many years by all who have interested themselves in experimental chemotherapy. For example, *T. rhodesiense* infections in man are notoriously resistant to arsenical treatment, and the reviewer and his colleagues showed some years ago that freshly isolated strains of *T. rhodesiense* and *T. brucei* in laboratory animals were highly resistant to arsenicals, whereas infections by old laboratory strains of *T. rhodesiense* were readily curable.]

Duke points out that among the changes which may occur in trypanosomes during prolonged maintenance by direct passage in laboratory rodents are (1) loss of power to develop in tsetse and (2) increase of virulence a third character which may also change in pathogenicity to man.

Once a strain has lost its power to develop in tsetse it retains for the student of human trypanosomiasis an interest mainly academic. Many old laboratory strains are now in all probability unable to develop in *Glossina*. This subject has been ignored by most investigators, although REICHENOW [this Bulletin 1935 Vol. 32, p. 34] has studied what appears to be a closely associated if not identical character viz. the culturability of these organisms in artificial media. Probably TAYLOR encountered one or two non-transmissible strains in his work in Nigeria [this Bulletin 1933, Vol. 30 p. 105]. In his introductory remarks TAYLOR refers to Duke's views as follows—

If this total loss of transmissibility occurs in nature with any frequency and Duke's analysis of East African *T. gambiense* strains suggests this, then it would seem that *T. gambiense* strains are constantly becoming extinct a conclusion of very considerable importance from the epidemiological standpoint. Duke states that his own experience of naturally occurring non-transmissible strains has been derived entirely from *T. gambiense* regions where *G. palpalis* is the only tsetse. Even here they were exceptional and he has met with only one non-transmissible wild strain of *T. brucei* and none of *T. rhodesiense* in its typical form virulent to man.

The second modification increase of virulence, may occur in nature. It is possible that direct transmission by *Glossina* plays an accessory part in the spread of the *brucei* group in nature, in the form of epidemics in man or domestic animals. But this must be incidental to the normal propagation of these trypanosomes. In nature increasing virulence for a vertebrate host is actually an embarrassment to a trypanosome, and yet in the laboratory there is a tendency to regard it rather as a kind of adaptation of the parasite to its host [and undoubtedly it is]. Duke complains that an enormous amount of work has been done in European laboratories during the last 20 to 30 years with trypanosomes which have little resemblance to their ancestors fresh from human or ruminant blood.

Laboratory changes and trypanocidal drugs.—A field biologist may well look askance at the majority of the representatives of *T. gambiense*

or *T. brucei* in European laboratories. Increased virulence is a common result of prolonged maintenance of a trypanosome in rats or mice and there is also evidence that the guineapig in course of time exerts a definite influence upon these organisms. Recently Duke has found that pathogenicity to man and transmissibility by tsetse may diminish apparently to vanishing point on maintenance of a strain in guineapigs.

It is interesting to determine how long old laboratory strains retain their power to infect man but the interest is mainly academic, because such strains may in the meantime have lost their power to infect tsetse. For instance, a strain of *T. gambiense* isolated from man in 1920 was still infective for man on subcutaneous inoculation in 1935 but it was completely non-transmissible by tsetse.

It is easy to make an old laboratory strain of say *T. brucei* resistant to drugs and this resistance as has been shown by YORKE and his colleagues is not diminished by cyclical passage through *Glossina*. Certain strains of *T. gambiense* on first isolation from man possess a considerable resistance to arsenic this may be a natural feature of the strains or the result of previous exposure to arsenicals. One attempt in Nigeria and one in Uganda to make a really sensitive strain of *T. gambiense* arsenic resistant have resulted in a serious impairment of transmissibility. If this proves to be a general fact, then the development of drug resistance in an ordinary arsenic sensitive *T. gambiense* has no practical significance [Much more work is, however required on this important subject before we should be justified in accepting this hypothesis which seems out of harmony with many observations.] Duke admits however that there is no denying the danger of producing strains resistant to arsenic by improper treatment of natives suffering from trypanosomiasis in *G. palpalis* and *G. tachinoides* areas. In practice this danger can be met by combining arsenic treatment with Bayer 205 or possibly by replacing arsenicals altogether by Bayer 205.

The author contends that the moral behind all these reflections is to abandon the study in laboratories the world over of ancient and atypical laboratory strains of the tsetse-carried trypanosomes and take up in their place samples recently isolated from their natural habitat. Study these until they start degenerating and then scrap them and so build up a first hand knowledge of the trypanosomes as they really are in nature. One result will be fewer disappointments over the claims made for new trypanocidal drugs when the time comes to test them out in real life.

[The reviewer who has had great experience during the last 8 years in examining the trypanocidal activity of new compounds is quite unable to subscribe to this doctrine. Most of those who are engaged in this work are well aware that it by no means follows that because a drug will cure laboratory animals infected with one or other of the old laboratory strains it will necessarily cure a naturally infected human being or a domesticated animal. But we have the great advantage of knowing that if we fail to cure our laboratory animal infected with our old laboratory strain the drug is not likely to be of any use in the field. The old laboratory strains are virulent for small laboratory animals and have for the most part reached a uniform degree of sensitiveness to drugs. They are therefore very valuable as a sort of common indicator for the preliminary sorting of new potential trypanocidal substances. There are a number of weighty objections to the course recommended by Duke. To mention two

of them Duke himself states in the present article that natural strains even of the same trypanosomes vary amongst themselves in their sensitiveness to drugs at the time of isolation. As the reviewer and his colleagues have shown some of these strains are so resistant to such well-tried drugs as trypansamide or organine that they would be quite useless as indicators for testing new compounds whilst others exhibit intermediate degrees of resistance. A second objection to the use of freshly isolated strains for this work is that such strains frequently run a chronic course in laboratory animals and are for this reason less well adapted for examination of the trypanocidal activity of new compounds. Finally we must not forget that such well-tried trypanocidal substances as atoxyl, trypansamide, organine and Bayer 28 all owe their discovery to work on old laboratory strains of trypanosomes.

If there be disappointments over the claims made for new trypanocidal drugs, they do not result from the method of conducting the preliminary tests of new compounds on small animals infected with old laboratory strains but from the ignorance of those who are neither able to distinguish between a mouse and a man nor to appreciate the fact that trypanosome strains change during prolonged syringe passage through laboratory animals.] W.Y.

TOKURA (N.) Ueber Trypanotoxin von *Trypanosomes gambiense* und *equiperdum*. [Trypanotoxin of *T. gambiense* and *T. equiperdum*]
—Reprinted from *Igaku Kenkyuu*, 1935, June, Vol. 9, No. 6, 14 pp. With 6 coloured figs. on 1 plate. [10 refs.]

A method of preparing trypanotoxin is described, and the effect of this upon the cornea of rabbits is examined.

In his introduction the author briefly reviews the earlier work on the subject of toxin formation by trypanosomes. The method used in the present work for preparing trypanotoxin was based upon Bearekka's method of extracting endotoxins from bacteria. The blood of mice at the height of infection was collected in 2 per cent. sodium citrate solution and the trypanosomes were separated from the red corpuscles by fractional centrifugation. The trypanosomes were then collected in a narrow graduated centrifuge tube and centrifuged for 20 minutes at 3,000 revolutions in order to measure their volume. The deposit was then taken up in physiological saline and centrifuged in large centrifuge tubes and at high speed, and the supernatant fluid removed. To the deposit sodium chloride was added in the proportion of 0.1 gm. to each 0.2 cc. of trypanosomes and the mixture ground up with a sterile glass rod, distilled water being added drop by drop up to 100 times the amount of sodium chloride used. The final result of this was an emulsion consisting of 2 per cent. of trypanosomes in 1 per cent. of sodium chloride solution. This was divided into two parts, viz.—(A) which was allowed to stand for 2 hours at 37°C., and (B) which was heated at 60°C. for half an hour both were stored in the ice-chest for 24 hours. The emulsions were then centrifuged at high speed and the supernatant fluids (trypanotoxin) removed. Preliminary trials with these two specimens of trypanotoxin showed that the latter (i.e. the one heated to 60°C. for 30 mins.) was considerably the more potent and consequently it was the one used in all the work described in this paper.

The test was performed in the following manner. Rabbits were firmly fixed and a 5 per cent solution of cocaine dropped into the eye the globe was then fixed with hooked forceps and 0.1 cc. of trypanotoxin—either the original solution or various dilutions thereof— injected with a very fine needle into the cornea. A circumscribed, sharply delimited whitish opaque definite swelling resulted. This swelling should within a few hours be completely absorbed. In order to examine the reaction a fluorescent solution (fluorescine 0.5 sod. bicarb 1.5 dist. water 100) should be dropped in the eye on the following day and each day afterwards for a week. If there is any ulcer of the cornea, the ulcerated region will appear more or less strongly green or yellow.

The following degrees of reaction were noted —

1 Typical ulcer formation. Deep green to dirty yellow colour edge more or less definitely undermined conjunctiva hyperaemic and cornea cloudy haemorrhage in the anterior chamber later staphyloma formation. Healing occurs in 10 to 18 days leaving a white area.

2 Moderate ulcer formation. Deep green to dirty yellow colour edge slightly undermined no staphyloma. Healing in 6 to 9 days leaving a white area.

3 Slight ulcer formation. Round sharply limited light green colour surface slightly rough. Heals in 2 to 5 days with hardly a trace.

The experiments are described in some detail and the results are summarized in tables. The following summary is given —

1 *T. gambiense* and *T. equiperdum* produce a trypanotoxin which will produce circumscribed ulcers in the cornea of rabbits.

2 Trypanotoxin withstands heating to 60°C for 30 mins but is completely destroyed by a temperature of 80°C for 30 mins.

3 It is also destroyed by N/5 NaOH and by N/5 HCl solutions

4 It loses its activity when exposed to direct sunlight for 2½ hours or to ultraviolet rays for 1½ hours.

5 It retains its potency when dried for at least 20 days.

6. The cornea of a rabbit immunized with *gambiense* or *equiperdum* formalized vaccines is less susceptible to the corresponding trypanotoxin. Similarly the reaction is modified if the rabbit is given a dose of the corresponding antitrypanosomal serum but not if a heterologous antitrypanosomal serum is administered.

In an appendix the author remarks that he was unable to obtain any reaction in the skin of rabbits with trypanotoxin when injected in amounts varying from 0.1 to 0.25 cc. He therefore conceived the idea of examining the Shwartzman's phenomenon with trypanotoxin. Eight rabbits were prepared by an intracutaneous injection into the shaved skin of the abdomen of 0.25 cc. of *gambiense*- and *equiperdum*-trypanotoxin and of typhus toxin each toxin being given in two places. After 24 hours 2 of the rabbits were given an injection of 2.5 cc. of *gambiense* trypanotoxin 2 a similar injection of *equiperdum* trypanotoxin 2 typhus toxin and 2 normal saline. The reactions are shown in a table. The combination typhus toxin preparation + typhus toxin injection produced a definite ecchymosis in the corresponding areas the combination typhus toxin preparation + trypanotoxin injection gave a similar but slighter ecchymosis. There was no reaction in the areas prepared with trypanotoxin.

W Y

KAPUSTO (M. L.) Zum Problem der direkten und indirekten Wirkung in der Chemotherapie. VII. Die Abhängigkeit des chemotherapeutischen Effekts von den antigenen Eigenschaften der Mikroorganismen. [The Problem of Direct and Indirect Action in Chemotherapy VII. The Dependence of Chemothapeutic Effect upon the Antigen Properties of Micro-Organisms.]—*Arch. f. Dermat. u. Syph.* 1935. Aug. 14. Vol. 171 No. 6. pp. 634-640.

In this paper Kapusto has examined the conclusion reached recently by Kroó et al., that there is a relationship between chemothapeutic effect and the antigen value of the parasite, or in other words that the failure of treatment is not due alone to relative drug-resistance of the parasite, but much more to factors which are related to the capacity of the parasite to produce immunization [this *Bulletin* 1932, Vol. 29 p. 648].

Kroó described experiments suggesting that the relapse strain which is formed by the influence of immune body on the original strain of trypanosomes is but slightly affected by salvarsan, because the antigen immunizing power of the relapse strain is feeble.

With the idea that the correspondence between the antigen capacity of the original and relapse strains and their sensibility to salvarsan is merely fortuitous, Kapusto has repeated Kroó's experiments except that instead of *T. brucei* (Prowazek) he chose a chronic infection (*T. gambiense*) which, under natural conditions, is associated with relapses and with the formation of relapse strains resistant to immune body. Mice infected with the original strain and with two relapse strains were cured with equal ease by salvarsan. In further experiments 9 mice were infected with the original strain of *T. gambiense* and then given a curative dose of salvarsan. 23 or 24 days later 3 of the mice were injected with the original strain, 3 with the first relapse strain, and 3 with the second relapse strain—all became infected. Another 8 mice were infected with the first relapse strain and given the same dose of salvarsan as the previous mice. After 24 or 25 days 2 were injected with the original strain, 3 with the first relapse strain and 3 with the second relapse strain. 1 of the 2 injected with the original strain became infected, 1 of the 3 injected with the first relapse strain and all of those injected with the second relapse strain. Finally if mice were infected with the second relapse strain and then treated as the above animals, all the animals injected with each of the three strains became infected.

In contrast to the findings of Kroó with *T. brucei* these experiments show that the antigen potency of the original and relapse strains of a chronic infection like *T. gambiense* is exactly the same.

The general conclusion reached is that Kroó's experiments afford no support for the theory of the indirect action of salvarsan. J. Y.

GOLDIX (H.) Influence des composés de la série du moranyl sur la coagulation du sang. [The Effect of Compounds belonging to the Moranyl Series on the Coagulation of the Blood.]—*C. R. Soc. Biol.* 1935 Vol. 119 No. 27 pp. 1409-1412.

In previous papers (this *Bulletin* 1935 Vol. 32, p. 355) the author has shown that moranyl possesses an anti-coagulatory action both *in vivo* and *in vitro*. This paper records the result of a comparative study of various compounds belonging to the same series.

When a rabbit is injected intravenously with 0.1 mgm. of moranyl its blood removed 5 mins. later remains liquid for 15 mins. and that withdrawn 20 mins. later for several hours. The blood of a rabbit removed 5 mins. after injection of inverse moranyl (isomeric of moranyl) remains fluid for 30 to 60 mins. but that removed after 20 mins. coagulates rapidly. The injection of benzoyl benzoyl (moranyl deprived of its methyl group) only slightly inhibits coagulation.

The minimum quantity of moranyl or benzoyl benzoyl required to prevent coagulation for 6 hours of 8 cc. of horse blood is 2 cc. of a 0.5 per cent. solution but for moranyl inverse it is 2 cc. of a 0.0125 per cent. solution. It follows therefore that the compounds slightly active *in vivo* manifest *in vitro* an anti-coagulatory action equal (benzoyl-benzoyl) or superior (moranyl inverse) to that of moranyl which alone among the compounds produces a durable effect *in vivo*.

The addition of liquefied gelatine produces a rapid but incomplete coagulation of the plasma obtained with moranyl inverse and a slow but complete coagulation of the plasma prepared with benzoyl benzoyl. On the contrary however the plasma prepared with moranyl, or oxalated or citrated plasma, is not coagulated by gelatine.

This work suggests that the anti-coagulatory action *in vitro* of the series of compounds studied is due to their capacity to modify the structure of the proteins whilst in their action *in vivo* a substance intervenes which is formed perhaps by modified proteins and destroyed by the tissues *in vivo* and by gelatine *in vitro* in the case of moranyl inverse and benzoyl benzoyl.

W Y

POTTIER (R.) & VAN DEN BRANDEN (F.) Contribution à l'étude toxicologique de la glyphénarazine pharmacopée belge IV (Tryparsamide tryponarsyl novatoxyl, trypotan.) [Contribution to the Study of the Toxicology of Glyphenazine. (Triparasamide, Tryponarsyl, Novatoxyl, Trypotan.)]—Bull. Soc. Path. Exot. 1935 Oct. 9 Vol. 28. No 8. pp 726-731

As a result of previous work on the toxicology of triparasamide for rabbits the authors suggested that for the official test the dose should be 1.0 gm. instead of 0.75 gm. as recommended by BROWN and PEARCE [this Bulletin 1933 Vol. 30 p. 788 and 1934 Vol. 31 p. 207]. LAUNOY and PRIEUR who examined the question later came to the conclusion that 0.75 gm. per kilo was the best dose [this Bulletin 1935 Vol. 32 p. 696]. Pottier and van den Branden reply to LAUNOY and PRIEUR in the present paper. They have summarized their toxicity tests and compared them with those of LAUNOY and PRIEUR in the following table.—

Number of rabbits surviving 7 days after injection of triparasamide

Dose per kilo	Launoy and Prieur		Pottier and Van den Branden	
	Number of rabbits	Alive (per cent.)	Number of rabbits	Survivals (per cent.)
0.75 gm	162	75.3	537	94.6
1.00	308	58.8	146	88.4
1.25	16	25.0	447	84.2
1.50	18	23.0	8	71.0

Pottier and van den Branden believe that their figures justify the conclusion reached in their previous papers, viz., that 1 gm. per kilo should be the official test dose. They consider that if the smaller dose (0.75 gm.) is selected there would be a risk of passing an abnormal lot of the drug. They do not question the accuracy of the results of LAUNOY and PATEUR, but consider the cause of the discrepancy must be looked for in local conditions, viz., the race of animals, their nutrition, climatic conditions etc.

The authors next pass to a consideration of the toxicity of trypanamide for the mouse. They point out that the chief danger to man is optic neuritis and that whereas the main toxic symptoms exhibited by rabbits are disorders of the alimentary canal, mice exhibit nervous symptoms (dancing mice of Ehrlich). Possibly therefore, information of much value might be obtained from tests of samples of the drug on mice. Various samples of trypanamide were selected and each was injected subcutaneously into a group of 10 mice—the dose in each case was 90 mgm. per 20 gm. of mouse. The results are shown in the following table—

	Mortality (per cent)	Avg. (per cent)	Virtue (per cent)
1 Glyphenazine normal.	--	0	10
2	--	0	20
3	--	0	20
4 (same product)	--	10	40
5 Glyphenazine spewed in manufacturer	--	10	80
6 Glyphenazine made yellow by the transient action of chlorine	--	0	00
7 Glyphenazine A suspect, returned after prolonged sojourn in Congo	--	0	100

These results suggest that possibly different specimens of trypanamide exhibit different degrees of neurotoxicity and that the mouse may be a valuable test animal.

W. S.

VAN DEN BRANDEN (F.), APPELMAXS (M.) & POTTIER (R.). La toxicité du tryponurile sur le parenchyme rénal. (The Toxicity of Tryponurile on the Renal Parenchyma.)—*Ann. Soc. Belges de Med. Trop.* 1935 June 30. Vol. 15. No. 2. pp. 225-228.

In a previous paper [this *Bulletin* 1935 Vol. 32, p. 685] the authors have drawn attention to the renal lesions produced by tryponurile, which is a product of L'Union Chimique Belge consisting of equal parts of tryponarsyl and urenille (hexamethylene tetramine). The present work was instituted with the object of ascertaining firstly whether it was the tryponarsyl or the urenille, or the combination of both which causes the damage to the kidneys, and secondly the dose which was necessary to produce these serious lesions.

Three groups of rabbits all weighing about 2 kilos. were injected intravenously with increasing doses of tryponarsyl, urenille, and tryponurile, respectively. Eight days later the animals were killed, the kidneys fixed in 10 per cent. formalin, sections were cut in paraffin and stained with haematoxylin eosin and safranin.

In none of the 7 rabbits which received doses of tryponarsyl, varying from 0.05 gm. to 1.25 gm. per kilo. were any renal lesions discovered. In the 5 rabbits which were given doses of urenille, varying from 0.05 gm. to 0.75 gm. per kilo., discrete lesions were found in the renal parenchyma and certain glomeruli were congested. In the 3 rabbits which received

small doses of tryponurile i.e., 0.1 gm. to 0.5 gm. per kilo practically no lesions were found but in the two animals which were given larger doses viz. 1.0 gm. and 1.5 gm. of urenone per kilo widely disseminated grave lesions were seen.

The general conclusion is that while it is not possible to say that a dose of 0.5 gm. of urenone is harmless it is clear that a dose of 1.0 gm. per kilo may produce very severe renal changes. In the treatment of human trypanosomiasis tryponurile should not be given in larger doses than 3 gm. to 4 gm. at any rate to commence with

W Y

BOURGUIGNON (G. C.) Note documentaire au sujet des trypansomases animales. [Documentary Note on the Subject of Animal Trypanosomiasis]—*Bull. Méd. du Katanga* 1935 Vol. 12 No 3 pp 109 111-123 125-132.

A general article dealing with the trypanosomes which infect the domesticated animals. It contains nothing new and requires no special notice here.

W Y

LAUNOY (L.) Suite à l'étude clinique et à celle du traitement de l'infection expérimentale du chat du lapin et du cobaye par *T. annamense* [Clinical and Therapeutic Studies on Experimental Infections of the Cat, Rabbit and Guinea-pig with *T. annamense*]—*Bull. Soc. Path. Exot.* 1935 Nov 13 Vol. 28. No 9 pp 817-823

From the work described in the present and a previous paper (1934) it appears that occasionally *T. annamense* infections of the cat can be cured with a single dose of 2 cgm. per kilo of moranyl. Cure can usually be obtained with two injections of 3 cgm. but even 3 injections (3 cgm. + 3 cgm. + 5 cgm.) sometimes fail. Attempts to cure infected rabbits with tryparsamide (0.15 gm. to 0.5 gm. per kilo) were not successful. In guinea-pigs cure was regularly obtained with doses of 40 cgm. per kilo of tryparsamide.

A number of therapeutic experiments were carried out on infected guinea-pigs with the substance m-amino-p-oxyphenyl-arsino-di-thiomalate of sodium. This trivalent arsenical compound is prepared by Gallhot and contains 11.64 per cent. of arsenic. The toxic dose for guinea-pigs is between 8 and 10 mgm. per 100 gm. of body weight. It was found that a dose of 5 mgm. per 100 gm. sufficed to cure guinea-pigs infected with *T. annamense*

W Y

LAUNOY (L.) PRIEUR (M.) & ANCELOT (A.) Préparation et étude d'une souche de *Trypanosoma Annamense* rendue arséno-résistante. [Preparation and Study of an Arsenic-resistant Strain of *T. annamense*]—*Bull. Soc. Path. Exot.* 1935 Nov 13 Vol. 28. No 9 pp. 857-866

Details are given of the production of an arsenic-resistant strain of *T. annamense* by the usual method of giving repeated sub-curative doses of tryparsamide to an infected guinea-pig. In this manner a strain was easily produced which resisted the maximum dose of 15 cgm. of tryparsamide per 100 gm. the curative dose for the normal strain is 4 cgm. per kilo. Experiments showed that this strain which had

been made resistant to trypanosomide in the guineapig, was resistant to trivalent arsenical, and that the resistance was maintained when the strain was passed into mice. [As the authors remark in their general conclusions this work confirms for *T. annulatum* some of the observations made by the reviewer and his colleagues with *T. rhodokerri*.]

H. F.

- v JAXCSÓ (V.) & v JAXCSÓ (H.). Chemotherapeutische Wirkung auf Kohlehydratstoffwechsel. Die Heilwirkung von Guanidinderivaten auf die Trypanosomeninfektion. [Chemotherapy Action and Carbohydrate Metabolism. The Curative Action of Guanidine Derivatives on Trypanosome Infection].—*Ztschr. f. Immunphysik u. Experim. Therap.* 1935, Oct. 3, Vol. 8, No. 1/2 pp. 1-30 With 5 figs. [41 refs.]

Previous work having suggested that there was a relationship between the carbohydrate metabolism of trypanosomes and their susceptibility to chemotherapeutic substances [this Bulletin 1935, Vol. 32, p. 72] the authors decided to follow up this idea by examining the influence of experimental trypanosomiasis in the mouse of the guanidine derivatives which give rise to hypoglycaemia. It was thought that if the curative action of germania really depended upon an interference with the carbohydrate metabolism of the trypanosomes, then it was possible that substances which were well known to affect sugar metabolism might prove to exercise a definite chemotherapeutic action.

The guanidine derivatives used were synthalim, synthalim B, mono-guanid and thioguanid. The experiments were performed on white mice infected with various strains of *T. brucei* viz., (1) An arsenic-fast variety of nagana "ferox," (2) a normal strain of nagana "Prowazek," and (3) a germanium-fast strain prepared from Strain 1.

It was found that synthalim acted most powerfully on Strains 1 and 3, in these cases cures could be obtained, whereas with the normal "Prowazek" Strain 2, as a rule, only a prolongation of the infection was obtained. This is very interesting because Strain 3 infection is readily curable by many chemotherapeutic substances, whereas Strain 1 is not only resistant to all arsenicals, but also to acridin and styryl-quinoline-derivatives, and Strain 3 is in addition also resistant to germania. The results of a number of experiments, which are summarized in tables, show that whilst the derivative synthalim exercises a curative action, the other derivatives have a comparatively feeble action.

Experiments were next undertaken to determine whether blocking of the reticulo-endothelial system (splenectomy + electro-colloidal copper) influences the action of synthalim. The results, which are given in a table, show that, whereas the normal mice infected with the arsenic-fast strain were all cured, the infections in the "blocked" animals were as a rule uninfused. The explanation given for this phenomenon is that the parasites are opsonized by the synthalim, and in the normal animals the opsonized parasites are removed from the circulation in masses by the phagocytes of the reticulo-endothelial system. This active removal of the weakened parasites from the circulation is one of the most powerful factors in the curative action of germania and synthalim. Elimination of the phagocytes prevents the drugs from exercising their curative action.

Morphological studies in blocked animals showed that synthalin produces the same changes in the trypanosomes as germanin does these are —

- (a) A slow cyclical degeneration of the flagellates.
- (b) Fundamental morphological changes similar to those produced by germanin firstly an unusually large number of two nuclear division forms then the characteristic micro- and macro-trypanosomes and multinucleate giant forms and finally bizarre degeneration and disintegrating forms.

The authors believe that synthalin acts directly and that the continuous hypoglycaemia which it produces causes a sugar blockade of the parasites metabolism.

W Y

KLIGLER (I. J.) & COMAROFF (R.) The Course of a Trypanosome Infection in Irradiated Rats.—*Amer Jl Hyg* 1935 July Vol. 22. No 1 pp 11-17

Experiments are described which suggest that daily exposure of rats for short intervals to direct solar irradiation fails to influence their resistance to trypanosome infection.

One group of rats was kept in an ordinary room in the animal house another group in a dark room at the same temperature and a third group in a dark incubator maintained at 29°-30°C. After acclimatization for 7 to 10 days the animals were exposed to direct solar irradiation. The exposure was made daily for 10 to 15 minutes between 11 a.m. and 1 p.m. over a period of 7 to 14 days. The rats were then infected and the daily exposure continued until death occurred. The effect of the irradiation was gauged by the duration of life after infection as compared with non-irradiated control groups kept under the same conditions.

The results of the experiments which continued over a period of two years and included 620 rats are given in tables. It appears that irradiation did not materially affect the resistance of the animals. W Y

RAFFEL (Sidney) The Influence of Diphtheria Toxin on the Infection with *Trypanosoma equiperdum* in the Rat.—*Amer Jl Hyg* 1935 Sept. Vol. 22. No 2. pp 339-363 With 3 figs. & 1 graph. [45 refs.]

Consideration of the biological properties of the diphtheria toxin suggested that an investigation of the possible parasiticidal activity of this substance in a trypanosome infection of the rat might prove of interest. It was thought for example that there might be a direct activity of the toxin on the trypanosomes as animal cells or alternatively that possibly the diphtheria toxin might exert some action on the protective elements of the host.

Albino rats were used in these experiments and were infected with a virulent strain of *T. equiperdum* by intraperitoneal injection of blood of passage mice. The diphtheria toxin employed was unusually potent containing 1 200 guineapig M.L.D per cc. A second toxin of which the L-dose was 0.2 cc. was used for purposes of confirmation. As a control for the activity of the toxin this substance was heated to 70°C. for 45 minutes according to RAMON (1923) such treatment destroys all toxic as well as anatoxic properties of diphtheria toxin. The elimination of toxicity by this method was confirmed by injection of large amounts into guineapigs.

The experiments are divided into two groups, the first dealing with the effect of the toxin *in vitro* and the second with its action *in vivo*. The technique used in the latter class of experiments was that derived by the reviewer and his colleagues (1929).

The following are the conclusions —

1. The injection of diphtheria toxin into rats infected with *Trypanosoma equiperdum* modifies the course of the infection. When it is injected intraperitoneally at about the time of infection, its influence is manifested as a prolongation of the incubation period, and in two instances, animals treated in this manner were freed of the infection. When injected intravascularly during the period of blood invasion, there is a marked decrease in the numbers of parasites in the blood and a subsequent "pseudo-relapse" in which the increasing trypanosomes are of a serologically weaker character.

2. The parasitoidal activity of the toxin *in vitro* is, so far as can be judged, much less marked than that of the pentavalent arsenicals or the *B. subtilis* "trypanotoxin" described by Levaditi and Twort, and is very far below that of the trivalent and arsenobenzol types of arsenic compounds.

3. The results obtained in the infected animals appear incompatible with those observed *in vitro*. However the evidence does not warrant the conclusion that the activity *in vivo* is partially the result of an antigenic process, the immunity mechanism of the host. The fact that the immune response does not regularly take part here as with the use of the chemotherapeutic substances may be explained on the basis of the general lowering of the condition of the host and the specific lesions in certain of the reticulo-endothelial tissues which large doses of toxin occasion in the rat.

4. The toxin does not decrease the infectivity of trypanosomes exposed to it. Neither does prolonged contact with this substance induce a resistance of the parasites to it, nor a change in their serological character.

15-1

Ascirove (Guglielmo) & di Bello (Giovanni) A proposito dell' antagonismo fra tubercolosi e tripanosomiasi. Ricerche sull'aggressività del B.C.G. ed il *Trypanosome brucei* [The Supposed Antagonism between Tuberculosis and Trypanosomiasis. A Study of BCG and Nagana].—Giorn. di Bacteriol. e Immunol. 1935, May Vol. H No. 5 pp. 1073-1078. English summary (4 lines)

In 1914 Orsi stated that an antagonism existed between the human type of *Mycobacterium tuberculosis* and Nagana. He recorded that guinea-pigs infected with the trypanosome lost the infection when inoculated with the tubercle bacillus, and vice versa that guinea-pigs infected with tuberculosis did not succumb with trypanosomiasis when inoculated with the blood of animals containing the trypanosome.

The authors made three series of experiments using Nagana trypanosome and BCG. The strain of trypanosome was virulent, killing in 7-15 days, average 11 days. In the first series 18 guinea-pigs were used, 6 being inoculated with trypanosomes (one drop of blood from the ear of an infected guinea-pig was diluted to 1 cc. with physiological saline) intraperitoneally on the 10th, 12th and 14th August 1934. On the 16th two of each group were injected with 0.5 cgm. BCG subcutaneously, another two intraperitoneally and six were kept as controls. They all died in 7-14 days showing that here at least there was no antagonism.

In the second investigation 3 guinea-pigs were inoculated simultaneously with trypanosomes and 0.5 cgm. BCG subcutaneously. 3

intraperitoneally and 3 with trypanosomes only as controls. All died in 7-15 days. The simultaneous infection with both does not therefore give any signs of antagonism.

In the third series 5 guineapigs were given 1 cgm of BCG subcutaneously and 5 had 0.5 cgm intraperitoneally. A month later these 10 and three others for control were inoculated with the trypanosomes. All died between 7 and 13 days after the trypanosome injection. In other words no indications could be observed of any protection afforded by BCG against infection by Nagana contrary to what ORSI had found as regards the virulent human type of *Myco tuberculosis* [see Bulletin of Sleeping Sickness Bureau 1910 Vol. 2 p 205] H H S

DUKE (H Lyndhurst) A Note on the Behaviour of Baboon and Monitor Blood in Tsetse Flies.—*Trans Roy Soc Trop Med & Hyg* 1935 July 31 Vol 29 No 2. pp 207-209

In the intestinal contents of *G. palpalis* which has fed on the baboon *Papio ursellatus* large masses of light green coloured crystals are found. The crystals persist for some days after the meal on the baboon. Two main types are found long cylindrical crystals shaped like a whetstone or a needle and a shorter form resembling Charcot Leyden crystals but round or oval in cross section. In flies fed on the monitor lizard (*Varanus ocellatus*) similar crystals are seen. No attempt has been made to study the crystals beyond the observation that they are soluble in ether. Duke concludes It is remarkable that the two animals whose blood is richest in the substance responsible for these curious deposits are to all intents and purposes completely resistant to infection with the polymorphic trypanosomes by any normal route.

W I

ROUBAUD (Emile) & TREILLARD (Marc) Un coccobacille pathogène pour les mouches tsétées. [A Cocco-bacillus Pathogenic to Tsetse.]—*C R Acad Sci* 1935 July 22 Vol 201 No 4 pp 304-306

Pupae of *Glossina morsitans* were received in France by air mail and though the adults emerged they died very quickly. Two were examined, and from one of them the authors isolated a cocco-bacillus of which they here describe the principal cultural characteristics. They have difficulty in thinking how the organism could have gained entrance to the body of the fly for which they feel sure it is pathogenic but they do not discuss the possibility that the fly died of some quite different cause and that their organism is a post-mortem contamination.

P A Buxton

MATZA (Salvador) GERMINAL & BASSO (Redento) Primer caso agudo de enfermedad de Chagas y primeros animales domésticos (perro gato) portadores de *Schizotrypanum cruzi* comprobados en la provincia de Mendoza. [First Case of Chagas's Disease reported in the Province of Mendoza.]—Universidad Buenos Aires Misión de Estudios de Patología Regional Argentina Jujuy 1935 Publicación No 24 pp. 3-16 With 6 figs. (3 maps)

The patient was a girl, 9 months of age who two months previously had suffered from fever to 38-39°C diarrhoea and vomiting continuous sideways movement of the head and clonic contractions of the

right leg. The convulsive movements cleared up in a few days, but fever diarrhoea and meningeal irritation "continued. The face was noticed to be asymmetrical due to oedema of the left temporo-malar region and eyelids with congestion and oedema of the palpebral conjunctiva. There was no thyroid enlargement. *Trypanosomes cruzi*, in small numbers was seen on examination of blood. *Triebium infestans* in the nymph stage were found infested in the dwelling, and dogs and cats in the houses of the district were found also to be infested. The presence of the parasite in the armadillo *Zacrytes picky canescens* had already been demonstrated by Dr. Mazza. H H S

MAZZA (Salvador) & GOVI (Luis). Caso agudo de enfermedad de Chagas clínicamente denunciado en el Chaco por conjuntivitis esquistripanosíca unilateral. [Chagas's Disease. An Acute Case in the Chaco.]—Universidad Buenos Aires. Misión de Estudios de Patología Regional Argentina Jaffey 1935. Publicación No. 24 pp. 19-27 With 8 figs. (1 map)

ROMERA has recorded unilateral conjunctivitis with oedema as an early sign of infection by *T. cruzi* and had in fact, based on this the hypothesis that the conjunctiva may be a portal of entry. In the case recorded here the unilateral ocular condition directed attention to the possible trypanosomal nature of the disease. When examined, the patient a child of 4 years, presented the appearance shown in the accompanying illustration. His temperature ranged to 40°C. with



Unilateral conjunctivitis with oedema as an early sign of infection by *Trypanosomes cruzi*.

[Reproduced from Publicación No. 24 Universidad Buenos Aires Misión de Estudios de Patología Regional Argentina Jaffey]

morning remissions. Blood in smear revealed no trypanosomes but they were seen in a thick drop preparation and the differential leucocyte count gave neutrophiles 38.6 lymphocytes 45.0 monocytes 15 eosinophiles 1.3 The liver extended 2 fingers -breadths below the costal border the spleen was just palpable. During the next week the oedema of the eyelids increased till the palpebral fissure was obliterated and the preauricular gland was enlarged. The log hut in which the family dwelt was very heavily infested with *Triatoma infestans*. In one day s capture two nymphs and two adults were found with many metacyclic trypanosomes.

The patient was given sulpharsenol starting with 0.06 gm then at 4-day intervals 0.06 0.12 0.12, 0.12, 0.18 0.18 gm by which time the fever and oedema had disappeared. Trypanosomes could no longer be seen, but the liver remained enlarged now 3 fingers -breadths below the rib border. The differential leucocyte count was neutrophiles 19.9 eosinophiles 4, basophiles 0.3 lymphocytes 61.3 large mononuclears 14.3 per cent.

H H S

MATTA (Salvador) & NASTRI DE FISCHER (Carolina) Investigaciones sobre la enfermedad de Chagas. II Primeras comprobaciones de casos de enfermedad de Chagas en San Juan. [First Proved Human Cases of Infection with *T. cruzi* in San Juan.]—Universidad Buenos Aires Misión de Estudios de Patología Regional Argentina Jujuy 1935 Publicación No 25 pp 12-18. With 3 figs.

Two cases are detailed both showing acute symptoms one was a girl of 8 years and the other of 11 months of age. In the first the course of the disease was mild the second died, cause unknown 6-7 weeks after the trypanosome infection had been discovered. One lived in San Juan itself the other just outside. These are said to be the first human cases to be seen or recorded in the Province

H H S

CÁCERES (Romeo) & IZAGUIRRE (Abelardo) Investigaciones sobre la enfermedad de Chagas. III Primer caso de forma aguda de enfermedad de Chagas determinado en la provincia de Entre Ríos y Litoral argentino [A Case of Acute Chagas's Disease in the Provinces of Entre Ríos.]—Universidad Buenos Aires Misión de Estudios de Patología Regional Argentina Jujuy 1935 Publicación No 25 pp 18-25 With 3 figs

The patient was a boy 5 years old. He presented the symptom which has been referred to before [see this Bulletin 1935 Vol. 32, p. 717] as an early sign viz localized oedema of the eyelids, malar and temporal regions in this case the right side. Examination of blood smears revealed the trypanosome and animal inoculation gave positive results. Carotid and supraclavicular glands were enlarged, but not the thyroid. He was given Paroxyl a quarter of a tablet twice daily

This is claimed to be the first case found in the Province of Entre Ríos. [Existence of these cases is gradually being determined in one Province after another it is possible that it is present more or less all over the Argentine.]

H H S

MÜLLING (Waldemar) Zur Spezifität der Komplement-Bindungs-Reaktion bei der amerikanischen Trypanosomiasis (Chagaskrankheit). [The Specificity of the Complement-binding Reaction in Chagas's Disease.]—*Arch f Schiffs- u Trop Hyg* 1933, Aug. Vol. 39 No. 8, pp. 315-328.

With the object of ascertaining the significance of the Machado reaction for the diagnosis of Chagas's disease the author has employed the test with the sera from about 200 patients suffering from other diseases. He has also followed the reaction throughout the course of *T. cruzi* infections in dogs.

A detailed account is given of the technique used in preparing the antigen. This was made from the organs of young dogs which were infected when they were about 12 days old. The dogs, which were severely affected, were killed from 4 to 8 weeks after infection. The organ selected was ground up with sand, and to one part by weight were added 1 part of glycerine and 2 of water and carbolic acid to the extent of 0.5 per cent. The extract was frequently shaken and kept at laboratory temperature for 5 days and was then filtered through gauze to remove the larger particles. The material was stored in the ice-chest. Guinea-pig serum, titrated in the usual manner, served as complement. The haemolytic system consisted of 1 cc. of 5 per cent. sheep's corpuscles in 0.9 per cent. saline in combination with titrated amboceptor (1,000-1-1,500).

It was found that in man the reaction was not specific, as the sera of syphilitics, pregnant women, of women just after child-birth, of cases of pernicious anaemia, of hyperthyroidism and of worm infections gave a positive reaction in a high percentage of instances.

In a splenectomized dog the reaction was positive when parasites first appeared in the blood on the 9th day after infection, whilst in another non-splenectomized dog the reaction was not positive until later in the infection. It appears that during the course of the disease in dogs the reaction varies in a rhythmical manner waxing and waning from time to time. A positive reaction was observed as late as the 38th day of the disease in one animal. It is noted that the Wassermann reaction was always positive when the Machado-reaction was positive.

W.Y.

NIMI (S.) Studies on Experimental Chagas Disease.—*Japane J. Experim Med* 1935 Aug. 10 Vol. 13 No. 4 pp. 543-551
With 6 coloured figs on 1 plate. [21 refs.]

This paper describes researches undertaken with the object of investigating the cause of anaemia in Chagas's disease.

The strain of trypanosomes used in this work was brought from Brazil in 1932, and has been maintained by passage through mice. In the later passages it was found that the incubation period was shortened. The younger the animals the more serious was the disease. The infection in splenectomized rats did not differ from that in normal animals.

The blood changes were studied in infected young rabbits fed on a standard diet. The red cell count gradually fell. In 1 to 2 weeks it had decreased by about a million, and by the 7th week it had fallen by three millions by which time the animals were moribund. The haemoglobin value fell pari passu with the red cell count. The reticulocytes

increased at first but decreased in number in the final stages of the disease. Polychromatophilic erythrocytes increase during the anaemia but decrease remarkably at the end of the disease. Nucleated red cells Howell Jolly's corpuscles and poikilocytes are not very numerous and thrombocytes decrease to a marked extent. Leucocytes at first increase and then gradually decrease in number in the final stages there is a definite leucopenia. The haematopoietic organs were examined and showed histological changes quite in accord with these changes in the blood.

In the second portion of his paper the author considers the cause of these blood changes seen in *T. cruzi* infections. He cultivated the parasite on a medium consisting of equal parts of 2 per cent. broth-agar and of defibrinated horse blood. After allowing the parasites to grow for 20 days at 23-25°C. the condensation fluid was removed centrifuged, and then filtered through a Chamberland L₅ filter in order to free it completely of trypanosomes. If this fluid is inoculated intra venously in a dose of about 2.0 cc. daily all the blood changes noted above are produced. Inoculation of the trypanosomes themselves freed from medium by washing in saline and killed by heating to 56°C. for 30 mins. failed to produce any anaemia.

In order to ascertain whether the culture fluid in the trypanosome bodies was possessed of antigenic properties rabbits were immunized with repeated injections of each of these substances. They were then tested by intravenous injection of large doses of culture fluid. It was found that the animals which had previously received the small doses of culture fluid were protected against the harmful effect of the large doses whereas those which had had the trypanosomes were rendered anaemic by the subsequent injection of culture fluid in just the same way as normal animals. Apparently therefore filtered culture fluid is possessed of antigenic properties whilst the trypanosome bodies do not contain these substances.

W Y

MATTA (Salvador) & DRIOLLET (E.) Investigaciones sobre la enfermedad de Chagas. I Comprobación de otra especie de armadillo en San Juan con infección natural por *Schizotrypanum cruzi* [Another Species of Armadillo found Naturally Infected by *T. cruzi*] —Universidad Buenos Aires Misión de Estudios de Patología Regional Argentina Jujuy 1935 Publicación No 25 pp 3-11 With 11 figs.

The authors examined six specimens of *Chaetophractus vellerosus pannosus* Thos. in Cochagual which is 60 kilometres south of San Juan, Sarmiento Province and found them heavily infected with *T. cruzi* the leishmanial forms being abundant in the heart and the striped muscles. This makes four species found naturally infected in the Argentine the others being *C. vellerosus vellerosus*, *Dasyurus novemcinctus* and *Zaedyus pichiy castrensis* [see this Bulletin 1935 Vol. 32, p. 717] H H S

BOVNE (C.) Over de Crithidiën van *Triatoma rubrofasciatus* de Geer Eerste mededeeling [On the Crithidia in *Triatoma rubrofasciatus*] —Gesels. Tijdschr v. Nederl. Indie 1935 Aug 20 Vol 75 No 17 p 1490 With 1 plate.

Referring to the paper by MALAMOS [this Bulletin Vol. 32 p. 718] recording the presence of *Trypanosoma cruzi* in monkeys from the

Dutch East Indies the author states that he has examined monkeys with negative result but has produced a trypanosome infection in mice by the inoculation of the crithidia which occur in the hind gut of *Triaenoma rubrofasciata* in Batavia. A similar observation was made long ago by LAPORT (1912) with the flagellates from this bug in Mauritius.

C. M. Wayea.

MALARIA.

CHRISTOPHERS (S. R.) Malaria Survey—*Riv. di Malaria*
Sez. II 1935 Vol. 14 Suppl. to No. 3 pp 87-95

Malaria survey is of the highest importance because it is impossible to determine until the actual facts are known which measures of prevention should be adopted, or indeed if any preventive measures should be taken. The truth of this is demonstrated by several examples the commonest anopheline in Bombay is *A. superpictus*, and this would certainly have engaged the attention of the health authorities had it not been for a malaria survey which showed that *superpictus* was harmless and that *A. stephensi* which breeds in wells and cisterns was the carrier. Owing to a religious tenet of the Parsees wells must be so situated that light from the sky can reach the water. Owing to the density of population communal houses several stories high are usual and a type of dwelling has resulted in which the tiers of living rooms opening inwards are arranged around a central, narrow space at the bottom of which is the open well. In other parts of the city *A. stephensi* bred in household tanks and cisterns. In the course of years almost all the wells in Bombay have been abolished or rendered mosquito-proof and stringent regulations are enforced regarding the protection of cisterns. Other instances of the value of preliminary malaria survey for example in the Punjab and the Andamans are given and also an outline of the technique of survey work.

H. Fletcher

JAMES (S. P.) L'épidémie de paludisme à Ceylan en 1934-1935
[The Ceylon Epidemic of Malaria, 1934-35]—Bull. Office Internat.
d'Hyg. Publique, 1935 June, Vol. 27 No. 6 pp 1135-1140 With 1 map & 1 diagram.

The island of Ceylon lies in the Indian Ocean between 5° and 10° North of the Equator. It is about half the size of England and has a population of 5½ million. About 60 per cent. of the population inhabit the humid, fertile south-west region which is traversed by the main rivers coming down from the central hills. It is in this region that the terrible epidemic has occurred. Malaria is always prevalent in Ceylon even in normal years about 1½ million malaria patients are treated at the hospitals and dispensaries, and the Government spends £23 000 a year on free quinine. Though there are many species of anopheles *A. culicifacies* is the only active carrier. Benign tertian is the commonest type of malaria and quartan comes next, malignant tertian is comparatively rare. The dry, north-eastern zone of the island is normally the most malarious the humid, south western province is almost free from it, and in its plains the splenic index is usually about 5 per cent. as compared with 70 per cent. in the dry zone. It had been noticed in the past that in dry years when the monsoon failed there was more malaria in the healthy humid zone and, in 1934 when the south-west monsoon not only failed but was entirely absent, the authorities became alarmed and sent out warnings to the sanitary inspectors. A fortnight later in the beginning of October the epidemic began and in November many of the dispensaries were treating ten times the usual number of malaria cases. By the middle of December the epidemic reached its height whole villages were struck down at once roads were blocked by victims painfully making

their way to the hospitals and dispensaries and the medical department was treating 60,000 cases a day. The first wave of the epidemic declined with the new year and came to an end in March, but it was quickly followed by a second. This second wave was apparently due to recurrences, and not to fresh infections [but see GILL, below]. The vast majority of the infections were of the benign tertian type and the production of late recurrences is characteristic of the benign tertian parasite. The case mortality, thanks to the comparative rarity of malignant tertian infections, was comparatively low—for the whole of the affected zone it was some 1.5 per cent, while it was about twice this figure at Kegalle which was the centre of the epidemic.

The primary cause of the epidemic was the complete failure of the south-west monsoon. Instead of the summer rains, there was drought from May to October. This had no effect upon the dry north-eastern zone which even in normal years is not reached by this monsoon, and the malaria there during 1934-5 was no worse than usual—but the effect upon the humid south-western zone was disastrous. There, the large lakes dwindled until each one became a collection of small shallow ponds, and the big rivers sank until nothing remained but a series of clear pools. The result was a veritable plague of mosquitoes. *A. culicifacies* swarmed into the houses, and spread malaria. The infection rate of mosquitoes caught in houses over the whole region was 14 per cent. The drought was not only responsible for the plague of mosquitoes, but also for a failure of the crops which brought the population to a state of poverty and malnutrition and made them readier victims. Another factor which favoured the epidemic was the absence of immunity in the south-western zone where malaria is uncommon and the people are not used to dealing with it. The author pays tribute to the central, municipal and charitable organizations for the energetic steps which they took to limit the effects of the epidemic. To have prevented it, even with unlimited funds and a very large staff, would have been an impossible task. It is one thing to control malaria in a small town or plantation but quite a different matter to suppress mosquito breeding in thousands of pools in the beds of large rivers and their affluents let alone those in the lakes and marshes. (See also WIGGLESWORTH this *Bulletin* 1935 Vol. 32, p. 732.)

W. F.

Ceylon Sessional Paper XXIII—1935 Report on the Malaria Epidemic in Ceylon in 1934-35. Together with a Scheme for the Control of Malaria in the Island [GILL (C. A.) Expert Adviser on Malaria to the Ceylon Government].—44 pp. With 7 charts, 9 maps & 11 photographs. 1935 Sept. Colombo Govt. Record Office. [Rs. 3.]

The epidemic was not due simply to excessive mosquito breeding and to poverty resulting from the drought, but to the presence of these conditions simultaneously with the presence of an 'X' factor which occurs periodically every 5 years and is associated with the malaria parasite. [Apparently a recurring high virulence or swarming of the malaria parasite.]

Colonel C. A. Gill, I.M.S. formerly Chief Malaria Officer Punjab was commissioned by the Government (1) To review the recent epidemic and to consider its probable consequences. (2) To review the anti-malaria work carried out in Ceylon during the last 12 years.

(3) To define the future policy in regard to malaria in Ceylon. (4) To formulate the scope and powers of an Anti Mosquito Ordinance.

He arrived in Ceylon at the beginning of April, 1935 and remained for about 5 months. He has drawn up his report in two parts the first is a general review of the epidemic the second embodies a scheme for preventing the occurrence of epidemics in the future.

Epidemics of malaria occur in Ceylon at intervals of about 5 years but that of 1934-5 was the greatest pestilence in the recorded history of the island and destroyed 80 000 lives in the space of 7 months. The great epidemic of 1867 in Mauritius is the only instance of an epidemic in the tropics which can compare with it. The Ceylon epidemic so far as mortality is concerned comprised a great primary wave which started in November 1934 and reached its height in the middle of January. It was followed by a smaller wave in May 1935 which was still declining in July. This second wave was associated with a rise in the infection rate of anopheles and it was therefore a true epidemic wave being due in part to new infections as opposed to relapses. Ceylon had been particularly healthy for some years before the epidemic there had been a conspicuous downward trend of the death rate for 10 years and more especially for the last 5. The death rate for 1932 (20.5) was the lowest on record. The actual onset of the epidemic was preceded by an increase of out patients at some of the dispensaries during the latter half of September a fortnight later the same thing occurred over a wider area and at the end of October the epidemic began with an explosive outbreak which occurred almost simultaneously over an area of about 5,800 square miles. This area comprises the healthy populous western quadrant of the island known as the wet zone in contradistinction to the dry zone in the north where malaria is hyperendemic (see JAMES above). Through out this area, almost the whole of the 3 million inhabitants already enfeebled by famine the result of a drought caused by failure of the south-west monsoon were suddenly overwhelmed with sickness. The epidemics of the past have occurred in the same area, and have also been associated with drought. Malaria in the dry northern zone is on the contrary associated with excessive rainfall.

Colonel Gill is full of admiration for the way in which the epidemic was dealt with by the Medical Department he writes of the prompt and thorough manner in which it was tackled the able manner in which the scheme was organized and administered by the Head of the Medical Department and, it may be added the splendid response made by all members of the Medical and Sanitary Departments to the heavy demands made upon them. There was never any shortage of quinine.

A. culicifacies the anopheline carrier of Ceylon is essentially a dry zone species widely prevalent in the north and east of the island where malaria is hyperendemic. It is much less prevalent in the comparatively healthy wet zone. In former epidemic years it has been found spreading southwards into the wet zone and during the recent epidemic it was found in vast numbers much to the south of its normal habitat more particularly in the neighbourhood of the rivers. Mr H F CARTER, the Entomologist has found that in years when the monsoon is normal, these rivers do not act as breeding grounds for *A. culicifacies* because they are subject to repeated flushing but in years of deficient monsoon rainfall such as 1934 the

full-flowing river is replaced by a series of rocky pools which constitute a favourite breeding place of this mosquito. Observations made before and during the epidemic showed that the pools and sheets of water in the river beds contained *A. culicifacies* in prodigious numbers, and it was in their vicinity that the epidemic first appeared and subsequently attained its maximum intensity. Colonel Gill does not think that the phenomenal breeding of anophèles in the river beds was the sole factor concerned. He points out that epidemics in Ceylon and many other countries tend to recur at intervals of 5 years or multiples thereof and he considers that periodicity plays an important part. This periodicity is presumably an attribute of the malari parasite the quality known as the "X factor" of Pettenkofel or the epidemic potential.

In 1934 a periodical epidemic was due and, at the same time, several other things happened to occur simultaneously which were favourable to the spread of malaria. (a) a population which was non-immune after a series of exceptionally healthy years. (b) a drought which caused poverty among the population and brought about an abnormal proliferation of mosquitoes. The drought alone would not have caused the epidemic—droughts occur at irregular intervals in Ceylon and they are not always associated with epidemic malaria, but, in 1934 the drought and the X factor and the non-immune population happened to be present at the same time. The X factor did not cause an epidemic in the dry hyperendemic zone of the north because the population of that part of the island is relatively immune. Again, the X factor was unable to cause an epidemic in the southern zone, although there were many non-immune children there and although the drought had the same effect upon the rice crops and the rivers as it had in the epidemic area. This freedom of the southern zone, Colonel Gill ascribes to the absence of endemic malaria—the spleen rate is only 0.5 per cent.—and to the scarcity of *culex fuscipes*. He concludes that "by broadening the basis of the existing hypothesis in regard to the mechanism of malaria epidemics so as to ascribe a larger part in their causation to a periodicity pertaining to the malari parasite, it is possible to provide a satisfying explanation of the remarkable characteristics of the Ceylon epidemic."

Colonel Gill studied and reported on the antimalaria work which has been carried out in Ceylon during the last 10 years or so. The measures included levelling the stocking of ponds and wells with millions," the treatment of water collections in the protected and controlled areas with oil or Park's green, and the provision of drains (mostly earth drains) for the removal of storm water. He found it most difficult to judge the amount of success achieved. The 5 years preceding the epidemic were exceptionally healthy and it was therefore hard to say how much improvement was due to antimalaria measures.

Another point is that in a place where the spleen rate has been reduced by antimalaria measures from say 60 per cent. to 30 per cent. the communal immunity has also been reduced and the proportion of children increased, and on this account an epidemic is likely to be more severe than if the spleen rate had remained at 60. "The organisation of the Malaria Department, as well as the technique of anti-malaria operations, is in all respects admirable, and, if it cannot command success, it certainly has deserved it. Taking all things into consideration it seems justifiable to infer that the control schemes have achieved a certain measure of success at Chilaw

Puttalam and Trincomalee but it is doubtful whether they have had much effect elsewhere. The restricted measure of success does not however reflect upon the measures and methods employed or upon the manner in which they were executed—the main reason is undoubtedly the slow progress made with the drainage schemes on account of lack of funds.

The second part of the Report deals with recommendations for the control of malaria in Ceylon. Colonel Gill expects that the effects of the epidemic will gradually disappear and that there will be no serious outbreak until that due in about 1940. Epidemics once started are uncontrollable but he believes that it will be possible to prevent their occurrence by the steady prosecution of antimalaria measures during interepidemic periods—epidemic malaria is epiphomenon of endemic malaria from which it follows that measures that will reduce the incidence of endemic malaria will also prevent the outbreak of epidemics. [This is hard to reconcile with the statement in another part of the report that the reduction of the spleen rate from 60 to 30 per cent. would make an epidemic more dangerous by reducing the communal immunity] The measures recommended are designed to eradicate the malaria-carrying mosquito to reduce the number of human carriers to alleviate economic stress and to improve hygienic conditions.

The main principle of Colonel Gill's scheme is that where possible malaria control should be entrusted to the local authorities who would be given such financial and technical assistance as might be necessary. The scheme depends for success he says upon public opinion. He proposes the enactment of an Anti-Mosquito Ordinance which will make occupiers of property responsible for the execution of antimalarial measures and empowers the Government in default to carry out the work at the cost of the occupier. He endorses the proposal to erect a Malaria Research Institute in commemoration of the Jubilee. Its function would be to carry out research and to give advice on all matters connected with malaria. Other important recommendations in his scheme are the creation of local public organizations under Medical Officers of Health and the creation of a Sanitary Works Board to assist the local bodies by grants in aid, to execute water supply and drainage schemes. The Director of Medical and Sanitary Services would exercise general supervision and the staff of the Research Institute would give technical advice. It is strongly emphasized that malaria control should be part of the work of the public health branch of the Medical Department. In rural areas

apart from simple measures that can be carried out by an intelligent sanitary inspector and the provision of ample facilities for the treatment of malaria the only measures that can be suggested for controlling malaria are general schemes for promoting rural betterment, more particularly land drainage schemes irrigation schemes and development schemes. It is recommended that Government should assume responsibility for carrying out such measures as may be found, after investigation to be practicable to control mosquito breeding in these rivers. As regards the control of malaria on estates legislation is recommended making it obligatory upon the Superintendents to carry out all reasonable antimalaria measures. Colonel Gill draws attention to several matters of detail, some of which are of vital importance it is necessary for example that the hospitals should be provided with microscopes and that the

medical officers should be instructed how to use them for the diagnosis of malaria. It is equally necessary that the stock mixtures of quinine should be standardized in order to ensure that proper treatment is given.

W F

CEYLON Sessional Paper XXII.—1935. The Ceylon Malaria Epidemic, 1934-35. Report by the Director of Medical and Sanitary Services [BRIERCLIFFE (R.)].—96 pp. With 15 photographs. Supplement to Sessional Paper XXII.—1935. Maps and Charts. 20 maps & 8 charts. 1935 Sept. Colombo Govt. Record Office. [Rs. 4.50]

Details are given of several cases in which death followed the administration of atebrin misonate.

This classical account of the Ceylon epidemic written by Dr R. Briercliffe, Director of Medical and Sanitary Services, was largely compiled from information supplied by different officers of his Department. It deals with events up to the end of April, 1935. During April and May a secondary wave of malaria swept over the epidemic area which will be dealt with by him in a future paper. A compilation from the same sources by Col. S. P. James has been summarized above, and consequently this summary of Dr Briercliffe's report is limited to matters such as the results of treatment with atebrin misonate.

A comparative test of atebrin misonate and quinine was made in the hospitals during April 1935. A group of 681 patients was given two intramuscular injections of 0.375 gram of atebrin misonate, with an interval of 24 hours between them. A second group of 424 patients was treated with two intramuscular injections of 15 grams of quinine followed by quinine given by the mouth. Nearly a quarter of the patients in the atebrin group as compared with more than a third of those in the quinine group complained of pain at the site of inoculation. There were two abscesses in the atebrin group, but none in the quinine group. There were more deaths in the atebrin group, and 4 of the 17 which occurred in this series were attributed directly to atebrin. One of the patients was a young adult who collapsed and died 4 hours after her first injection. The other three were children: the first, aged 8 months, collapsed immediately after the injection and died 16 hours later; the second, aged 4 years, collapsed and died 4 minutes after the first injection; the third, aged 2 years, died a few minutes after the second injection.

Between May 20 and May 31 1935, 1,387 persons in malarious villages were treated with atebrin injections. 61 suffered from toxic symptoms such as vomiting, collapse and abdominal pains. Mental symptoms, which in most cases lasted for about a week, occurred in 8 patients and one of them died from exhaustion. Pain at the site of inoculation was complained of by most of the patients, and in 9 abscesses resulted. The data available did not allow definite conclusions to be drawn with respect to the relapse-rate, "but the impression exists that a full course of atebrin by mouth (1.5 grams) has a greater effect in preventing the return of fever than a week's careful treatment with quinine, and that either of these courses of treatment is superior in this respect to two injections of atebrin misonate."

The following conclusions were reached from a study of the reports from hospitals and dispensaries in the epidemic area. "Probably in rather more than a half per cent. of the hospital patients treated with atebrin misonate death has been attributed to the drug. The greatest

care is necessary in the selection of patients for treatment. Small children have been specially liable to develop sudden collapse or convulsions. The majority of patients suffering from malaria do not require to be treated with injections whether of quinine or atebrin. When however treatment by injection is indicated quinine is to be preferred to atebrin on account of its greater safety. Among adults pregnant women have been found particularly liable to collapse after the injections. Sometimes symptoms of chronic or delayed atebrin poisoning which were attributed to faulty excretion of the drug appeared towards the end of a course of treatment. The temporary mental derangement which may result from the administration of atebrin proved a serious objection to its use in one district where several hundred people had been treated with oral atebrin at least 15 cases occurred and the use of atebrin was abandoned.

Colonel C. A. GILL writes in his report which is summarized above that

It is possible that the relative frequency with which toxic (cerebral) symptoms and abscesses at the site of injection are reported to have followed the administration of atebrin musonate during the epidemic is attributable to the low state of vitality of many of the patients. In these circumstances it is doubtful whether any experiment with atebrin musonate carried out in Ceylon during the epidemic is calculated to throw light upon its value under normal conditions.

The course of the epidemic can be followed in the Press Communiqués which were issued by the Ministry of Health and of which copies are printed as an appendix to the Report. The hospital deaths and admissions for malaria were October 1 584 cases 32 deaths November 4 178 cases, 65 deaths December 14 480 cases 381 deaths. The amount of malaria in the epidemic area began to decrease during the last week in December throughout January and February the decline continued and in March it became even more rapid, but in April the situation became less favourable owing to localized outbreaks.

Extensive anti-larval measures were started in January. The oiling of breeding places in the beds of the main rivers and their larger tributaries was undertaken where *A. culicifacies* larvae were found to be prevalent and 300 miles were brought under control. The Report contains some good photographs of the rock pools in the bed of the Maha-oya Ceylon's largest river which were breeding places of *A. culicifacies*. The following is taken from a communiqué issued by the Ministry of Health —

The Department wishes to make it clear that the mosquito which is carrying malaria in Ceylon viz *Anopheles culicifacies* is not breeding in roof gutters coconut shells, cans etc. but in open pools of clear water in river beds and in rock quarries. It may also be found in shallow wells, brick pits, borrow pits saw pits etc. where the water is clear and exposed to sunlight. It does not breed to any great extent in paddy fields or swamps.

W F

DICKSON (R. M.) The Malaria Epidemic in Ceylon, 1934-35.—*Jl Roy Army Med Corps* 1935 Aug Vol 65 No 2 pp 85-90

The author directs attention to the poverty and distress caused by the drought and to the measures taken to alleviate these and combat the epidemic of malaria.

Col. JAMES's report of this epidemic has already been summarised. The present paper deals more fully with the measures taken. The medical authorities always keep a reserve supply of quinine equal to 10 months normal requirements—more than 7,000 lb. were available at the beginning of the epidemic and additional supplies were quickly obtained. The State Council approved the formation of a Malaria Relief Fund. The Government contributed 300,000 rupees and the public about 45,000. Local Relief Committees were appointed and these were responsible for the distribution of rice and foodstuffs. At the dispensaries in the worst areas Horlick's malted milk was distributed to the children, and food kitchens were established by voluntary agencies. "Distress and destitution are likely to increase for some time to come but relief measures are now well organized and are sufficient to meet the situation." (See also S. P. JAMES *Bulletin* and GILL, above.)

W. F.

FEDERATED MALAY STATES. Annual Report of the Malaria Advisory Board for the Year 1934 (KINSEY (A. Neave) Chairman—27 pp. 1935. Kuala Lumpur F.M.S. Govt. Press.

This contains an important report on drain flushing as a method of larval control. It also contains a good summary of antimalarial work done in connexion with fish-ponds in Java, and notes on *A. annulipes* and *A. barberensis* as carriers in the Federated Malay States.

A committee appointed by the Board to inquire into the utility of sluicing as an antilarval method in Malaya reported that—

"Sluicing has not so far been found dependable in preventing the breeding of larvae in those seepages and small water channels which form the principal breeding places of *A. annulipes*. In small streams running in firm soil, in those streams in flat land which require treatment, but predominantly in streams running over rock, sluicing is likely to prove of value in antimalarial work. Sluicing is unsuited to use in streams in the more friable soil characteristic of a great part of the country. In these streams the rapid erosion caused by sluicing results in undercutting of the banks, the formation of numerous side pools and silting up of the reservoirs. It is considered that sluicing is unlikely to prove of sufficient general application to warrant further extensive experiments by this Board."

In the Cameron Highlands, where Professor Williamson first reported the successful employment of sluice-gates, further investigation showed that "the use of temporary gates here on a large scale has not been sufficiently successful, either economically or in preventing larval breeding, to justify the method replacing oiling control." Sluicing was tested over a period of 11 months in the town of Lutis, in Pahang, and the Health Officer reported "Chinese squatters living in the ravine while sluicing was employed developed malaria for the first time when oiling was resumed no more cases of malaria occurred. On the other hand, considerable success has been claimed for the method in Province Wellesley and in the Island of Penang. (See this *Bulletin* 1934 Vol. 31 p. 153 and 1935 Vol. 32, p. 429).

Dr B. BARROWMAN drew attention to an increase of malaria in the flat coastal districts of the west coast where *A. annulipes* is the carrier. Clean drains and clean weeding had controlled the breeding of this mosquito but owing to hard times weeding had been neglected and drains had become blocked. The shade necessary for the breeding of this mosquito could be provided by vegetation only a few inches

high. It was not enough merely to fell heavy jungle the entire surface had to be clean weeded.

Dr R S JOHNSTON reported on endemic malaria in the township of Batu Gajah where it has been found that *A. barbirostris* is the vector.

Dr J C P GREY who had paid a visit to Java in order to study the methods of malaria control adopted there gave an account of the different methods by which the fish ponds are treated in order to prevent mosquito breeding. He stated that It had been in many ways curious after experience in Malaya to see the light hearted treatment accorded to *A. maculatus*. In no place was its control by anti-malarial oiling or by subsoiling observed. W F

SWELLENGREBEL (N H) The Basis of Malaria Control by Antilarval Measures in the Netherlands.—*Malayan Med Jl* 1935 Sept. Vol. 10 No 3 pp 61-66

Professor Swellengrebel has the gift of lucid exposition. This is a delightfully clear account of the spring epidemic of malaria in northern Europe and of the different types of *maculipennis*. It should be invaluable to lecturers and students and has been summarized rather fully for this reason though it covers ground which has been covered already by papers previously summarized in this *Bulletin*.

The only species of Anopheles in Holland is *A. maculipennis*. It is present throughout the whole country but malaria is limited to the coastal provinces. It does not occur in all of them the province of South Holland is just as watery and low-lying as the others yet it is free from malaria while the adjoining province North Holland is the most malarious area in the country. The problem which faced the author on his return from the East in 1919 was to discover the reason for this and here he tells how it was done.

Benign tertian malaria occurs every year in North Holland and in epidemic years as many as one-fifth of the total population may be attacked. The epidemics occur about every twenty years and they last for 3 or 4 years. The highest incidence of malaria is in May June and July. During the period January to August of the epidemic year 1920 the author dissected a large number of mosquitoes caught in houses where malaria was rife but he found hardly any infected specimens and would have given up the search in disgust had he not been dissuaded by his friend Dr Korteweg. Korteweg had been practising for many years in a malarious village north of Amsterdam every spring he had seen a number of primary cases of malaria at a time when there were no mosquitoes about and he came to the conclusion that these spring cases were the result of infections which had been acquired in the previous autumn and had remained latent throughout the winter. The number of cases of malaria in Holland varies inversely with the number of mosquitoes present at the time in the spring when there are no mosquitoes the greatest number of malaria cases occurs. During the period September to February when there are no malaria cases the greatest number of anopholes are found in houses. Swellengrebel was persuaded by Korteweg to continue his dissections in the autumn and winter when the malaria season was over. He writes—

Although I had little faith in dissecting anopholes at the tail-end of the malaria season, I did as Korteweg told me. Well, it gave me the thrill

of my life. Here they actually were—the infected anophèles, which I had been vainly looking for in summer. Three per cent. of all the mosquitoes collected in September were infected. 5-6 per cent. in the other months of the year 1920 and a lower percentage in January & March. Then the infection stopped. Why did I not find infected anophèles in summer? For two reasons first, because these anophèles do not usually feed on man in summer but they do in autumn. Catching anophèles in houses in summer and selecting the engorged females, yields us only with human blood out of every ten tested. But from September onwards eight or nine out of every ten tested have bitten man. That's one reason. The other is that infected anophèles in summer are creatures of a short life. There is a heavy mortality among them. But as soon as egg-laying stops and that happens by the beginning of September, the mortality sinks from over 60 dying within 4 weeks out of a batch of a hundred, to no more than 20 dying within 4 weeks out of a batch of a hundred."

Though infected anophèles are most numerous in the autumn the malaria season does not occur until the following spring. Korteweg's hypothesis that the infections, transmitted to man in the autumn, remain latent until the spring, was confirmed by James in England and by the author and his colleagues in Holland, where 8 volunteers who were bitten experimentally by mosquitoes in the autumn first showed signs of malaria in the following spring and summer.

The author found that during the season of transmission, that is during the autumn and winter the warm houses and stables contained many anophèles which were wintering there. These "winterers," as he calls them, continued to suck blood although they had ceased to lay eggs and therefore had no need to leave their shelter. In some districts, the anophèles sought cold lofts and sheds in which to pass the winter rather than the warm houses and stables. These anophèles were in a state of hibernation unlike those in the warm shelter, they did not continue to feed after they had ceased to lay eggs. A map was prepared showing the distribution of the winterers and the hibernators throughout the Netherlands in autumn and winter. It then came out that the winterers preponderated in the malarious coastal districts and the hibernators in the healthy inland districts. As regards the one healthy coastal province South Holland, there too the anophèles were hibernators, while in the malarious provinces of North Holland, to the north, and Zeeland to the south, they were winterers. In all these provinces the anophèles breed in the ditches, but South Holland is the delta of the Rhine and Meuse and its ditches contain fresh water. The malarious province of North Holland has the North Sea to the west, and the Zuyder Zee to the east—no rivers carrying fresh water run through it and consequently the water in the ditches is brackish. The malarious provinces are characterised by the presence of winterers and of breeding places containing brackish water—but in the healthy provinces, the anophèles are hibernators and the breeding places contain fresh water.

Is there a fundamental difference between the winterers and the hibernators? The two types were collected separately in their winter quarters and kept in the laboratory until they laid their eggs and until these produced larvae. It was then found that there were morphological differences between the eggs and larvae of the winterers on the one hand and of the hibernators on the other. The winterers will breed in captivity and it was soon established that the egg and larval characters remain constant from generation to generation.

The hibernators will not breed in captivity but male hibernators will mate with female winterers and male winterers with female hibernators it has been found however that the eggs which result from these cross-matings rarely hatch and if they do the larvae all die within 24 hours. The winterers and the hibernators are therefore sexually isolated they are indeed constant species. More recently it has been found possible to distinguish the adult winterers from the hibernators during the autumn and winter by the shape of their salivary glands. Consequently they can now be separated in cases where they are both occupying the same winter quarters as they do in attic bedrooms. Here they are not segregated as they are in warm rooms and stables on the one hand, and in cold lofts and sheds on the other in the attics both types find what they need blood for the winterers and a low temperature for the hibernators. The hibernators never touch blood and are never infected, though they may be perched on the same wall as the winterers which in some houses during the autumn of 1934 were found infected up to a maximum of 25 per cent. [see DE BUCK and SWELLENGREBEL, below]

The author and his colleagues next discovered that the different types preferred different places for breeding purposes. They examined over 1 400 breeding places and over 23 000 larvae and they came to the conclusion that the hibernators preferred fresh water with less than 500 milligrams of chlorine per litre while the winterers (*A. maculipennis atroparvus*) preferred brackish water with a salt content of more than 1 500 milligrams of chlorine per litre. The malarious province of North Holland has sea on both sides and brackish water in its ditches but the sea on the east side has now been cut off from the open sea by a dam and as the river IJssel flows into it, it is gradually becoming less brackish. This is a part of the Zuyder Zee reclamation scheme now in progress. It is hoped that this fresh water lake can be used to reduce the salinity of the surface water in North Holland to a harmless level when this has occurred it is expected that the hibernators will invade the province at the expense of the malaria-carrying winterers and that malaria will gradually disappear

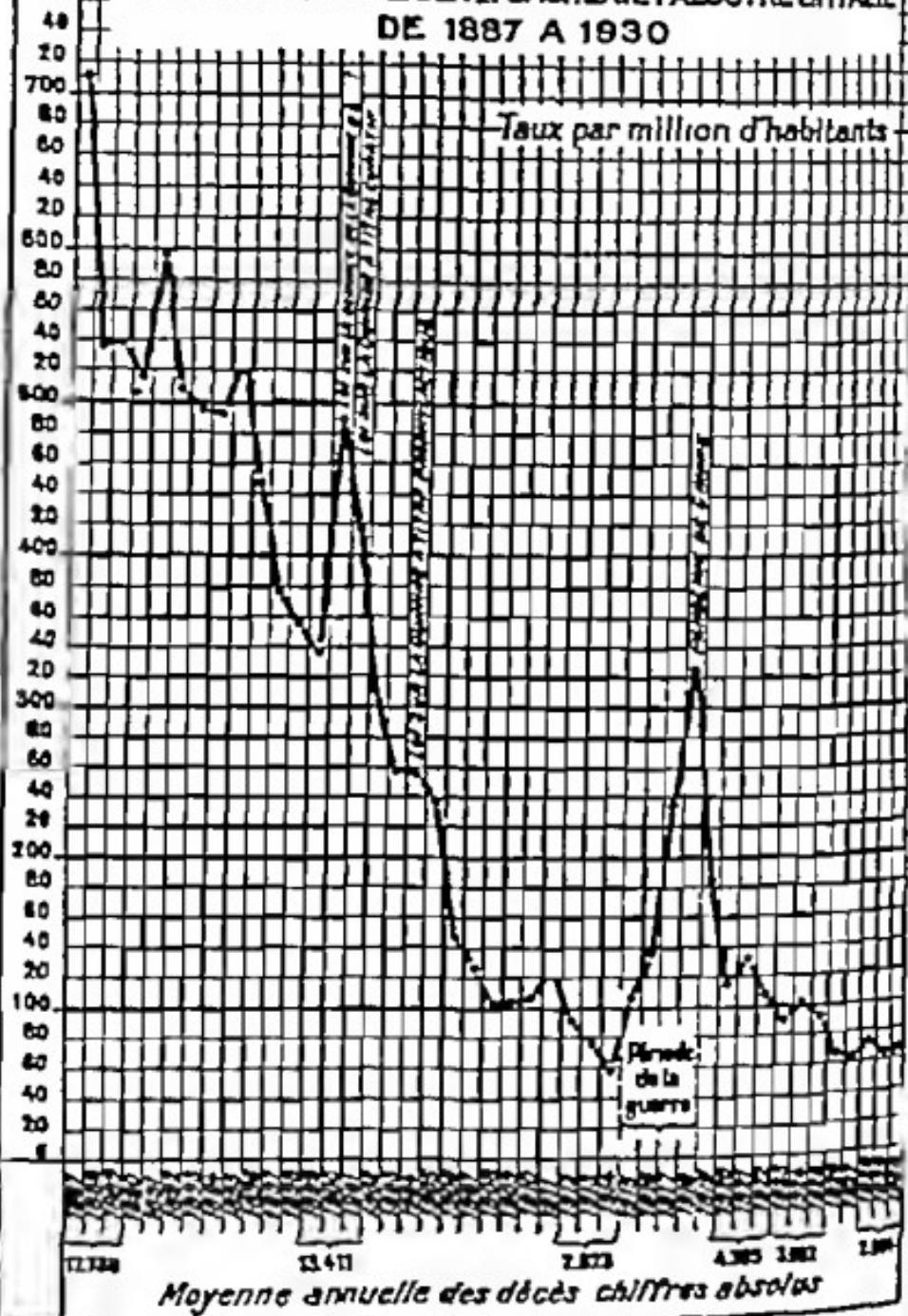
W F

LUTRARIO (A.) La malaria en Italie. [Malaria in Italy]—*Bull. Office Internat d'Hyg. Publique* 1935 June Vol. 27 No 6 pp. 1141-1160 With 2 charts.

Many papers have been written about malaria in Italy and many of them have been summarized in this *Bulletin*. The present paper deals with the subject in an interesting and comprehensive manner and the author demonstrates clearly the remarkable decline of malaria in Italy during the last 50 years particularly since the application of the malaria laws and the systematic distribution of quinine.

He draws particular attention to the rhythmical rise and fall which occurs in malaria. Small cycles which coincide with the yearly seasons larger ones with periods of 4 or 5 years, and others yet larger whose duration is to be measured in centuries. These large cycles are demonstrable in the history of Rome. In its early days it was free from malaria, but in the third century B.C. the disease appeared in epidemic form. At the beginning of the present era Rome was once more healthy but in the sixth and seventh centuries malaria was again severe. In the eighth century there was a remission and

MORTALITÉ PAR MALARIA ET CACHEXE PALUSTRE EN ITALIE
DE 1887 A 1930



Mean annual death rates per million from malaria in Italy from 1887 to 1930.
[Reproduced from the *Bulletin de l'Organisation Internationale d'Hygiène Publique*.]

prosperity returned to the country. In the ninth, the country was once more devastated by malaria. The next period of relative freedom appears to have been at the time of the Renaissance, but from 1600 to 1750 malaria was again severe. Then once more there was an amelioration until the nineteenth century when malaria increased again. From the year 1879 onwards, there was a tendency to spontaneous regression which is apparent in the accompanying graph.

The graph also shows in its earlier part the cyclical exacerbations which occur every 4 or 5 years and demonstrates how these have been suppressed since the quinine laws were instituted at the beginning of the present century. Subsequent to the manufacture and free distribution of quinine by the State the death rate per million from malaria sank from 417 in 1900 to 57 in 1914

W F

COLONIAL DEVELOPMENT FUND (MALARIA RESEARCH SCHEME)

Report on Work done at Dar es Salaam during the Period January 1932-January 1934 [MACKAY (Roderick) Malaria Research Officer]—79 pp With 13 charts & 4 folding plans. [11 refs]

1935 London Crown Agents for the Colonies 4 Millbank SW 1 [10 Shs.]

Of special general interest are an outbreak of poisoning following the use of Paris green a number of cases of congenital malaria and the finding of *A. costalis* in brackish water.

Dr Mackay's report on this very thorough survey of Dar-es-Salaam begins with a review of the investigations of KOCH and OLLWIG. In 1899 KOCH instituted an anti-malaria campaign by means of quinine. This work was continued for 12 years. Its effect was to reduce the total amount of malaria but it was useless as a method of eradicating malaria. The town was only a fishing village in 1890 when the German administration was established. It lies in a valley half of which is below sea level a tidal flap in an embankment constructed during the German administration prevents the ingress of the sea. The population totals 33 000 consisting of many different African tribes two-thirds are Bantus. The examination of a random sample of 8,310 persons showed that 54·2 per cent. were infected. The parasitic index in children was 77·2 per cent. The commonest infection was subtartian of 6,071 positive examinations there were 4,069 or 66·9 per cent. subtartian 969 or 15·9 benign tertian 587 or 9·9 quartan while 446 or 7·3 per cent. were not differentiated these last included a small proportion of *P. ovale* and *P. falciparum*. It seems likely that the human host finds it easier to establish an equilibrium between himself and *P. vivax* or *P. malariae* species than is the case with *P. falciparum* which alone persistently increases with advancing age a considerable proportion of children are born with definite evidence of malarial infection contracted *in utero*.

44 blood smears taken from the peripheral blood of infants at birth have yielded eight subtartian trophozoites and one benign tertian gametocyte. *Anopheles gambiae* (costalis) is by far the most important mosquito. *A. gambiae* and *A. funestus* were the only anophelines caught in houses. Out of 146 *A. gambiae* dissected, 6·8 per cent. were infected with sporozoites out of 179 *A. funestus* 3·3 per cent. were infected. *A. gambiae* was found breeding not only in fresh water but also in water with a high saline content. It usually breeds in shadeless water while *A. funestus* prefers a degree of shade. An examination of anopheline stomach contents showed that 81 per cent. contained human blood. Other figures indicating the amount of malaria in the town are a spleen rate of 83·8 and an incidence of 5·9 cases of black water fever per 1,000 cases of malaria. The development of the parasite in the mosquito occupies 10 days in the wet season but 21 in the dry season. A number of cases were given atebrin 0·2 gram and plasmoquine 0·02 gram daily for 8 days. Epigastric pain was

invariably complained of by adults towards the end of the 8-day course but it did not occur if the phenoquine was discontinued on the 5th day. Benign tertian sometimes fails to react to these drugs. The report contains a note on an outbreak of poisoning which resulted from the use of Paris green as a larvicide. The routine treatment of 8 water-holes and a weed-covered pool once weekly maintained over a period of three months, resulted in the illness of 132 persons, representing a large proportion of the native community using the treated water for domestic purposes. the strength of the final dust was 1 : 100." W F

COWELL (G) BAILY (J D) & VIDYA PRASAD An Experiment with Paris Green in a Hyperendemic Village in Sind.—*Records of the Malaria Survey of India*. 1935. June. Vol. 5. No. 2. pp. 131-152. [11 refs.]

Paris green is not a suitable larvicide for dealing with running water. The control of malaria in hyperendemic rural areas in India is not likely to be achieved by antilarval measures. Lack of tools is the greatest obstacle to the control of malaria in rural areas. The antilarval work described here cost about 2½ pence per head per annum, and that is apparently more than would be available for general use. In the Panama Canal zone, Gorcas spent 2 dollars gold per head per annum, on malaria prevention. The experiment described by the author was carried out in a hyperendemic village in Sind. Anopheles breeding places were dusted with Paris green for a limited period of each year over a period of 4 years. Conditions were considerably altered during the last two years by the institution of new irrigation under the Lloyd Barrage scheme. There was a partial success during the first two years, but this was not maintained. W F

COWELL (G) The Effect of Paris Green Dusting on Rice Crops—*Records of the Malaria Survey of India*. 1935. June. Vol. 5 No. 2. pp. 153-157

The general opinion among malaria workers is that Paris green has no harmful effect upon rice crops. The farmers in many places say that it is beneficial because it destroys the insect pests. The Deputy Director of Agriculture Orissa Range, Cuttack states that Paris green is harmful if applied early in the morning when the flowers are open, but if the dusting is done in the afternoon, when the flowers are closed, no harm results. These opinions were obtained by the author from published papers, and as the result of a questionnaire sent to malariologists in India and other countries. W F

SYDENSTRICKER (V P) & VARIOVIS (G P) Vital Staining of Malarial Parasites. A Preliminary Note.—*Jl. Lab. & Clin. Med.* 1935. July. Vol. 20. No. 10. pp. 1084-1096. With 1 fig

The authors have found that for the study of malarial parasites vital staining offers certain advantages over the methods usually adopted. Various stains have been investigated but the best results were given by a saturated solution of brilliant cresyl blue in sterile physiological saline. A small drop of this (2 c.c.m.) is placed on a slide and a cover glass on which a drop of blood has been placed is dropped on to the stain. The preparation is ringed and is ready for

examination at once as staining of the parasite is almost instantaneous. The parasites remain alive for upwards of 2 hours on the warm stage. The paper describes the attachment of merozoites to the red cell, their movement over the surface of the cell before penetration which is followed by the development of an extraparasitic vacuole and the character of other stages both for *P. vivax* and *P. falciparum*. Changes in the parasites are brought about by the administration of quinine. It seems that the method will be useful for the study of the relation of the parasite to the reticulocyte and of the action of drugs. A black and white half tone plate illustrates some of the appearances noted.

C M Wenyon

PAWAN (J. L.) The Preservation in the Tropics of Blood Smears stained by the Romanowsky Stain.—*Ann Trop Med & Parasit* 1935 Oct 5 Vol. 29 No 3 pp 327-328.

Seven years ago the author published a note to the effect that Romanowsky stain and its modifications could be kept without deterioration in the tropics if maintained in solution in a Pyrex bottle [this Bulletin 1929 Vol. 26 p 563]. The preservation of the stained blood smears for future reference or study is another question altogether they usually deteriorate markedly within a year under tropical conditions. Dr Pawan finds however that if the stained slide be dipped in saturated solution of paraffin wax in xylol (kept saturated at 37.5°C. in the thermostat so that a cloud of solidifying paraffin begins to appear after removal to room temperature) by evaporation of the xylol the slide is coated with a thin layer of paraffin. It can then be put away and when the slide is needed for examination the paraffin is removed by immersion in xylol. When finished with the immersion oil is removed with xylol and the whole slide redipped. Thus treated slides have kept the original staining unaffected for over 5 years in Trinidad, even though exposed to sunlight in the laboratory.

H H S

BOYD (Mark F.) The Comparative Morphology of the Sporozoites of the Human Species of *Plasmodium* Marchiafava and Celli, 1885.—*Jl Parasitology* 1935 Aug Vol 21 No 4 pp 255-259 With 3 plates.

Comparing the sporozoites of the three common malarial parasites of man the author finds that individual variations are so great that species identification is quite unreliable. Nevertheless he finds that generally those of *Plasmodium falciparum* are the finest and those of *P. malariae* the coarsest. Similarly the chromatin mass is densest in the former and most diffuse in the latter. Three pages of outline drawings illustrate the various types of sporozoite observed.

C M W

DE BUCK (A.) Ein morphologischer Unterschied zwischen zwei *Plasmodium vivax* Stämmen. [Difference between Two Strains of *Plasmodium vivax*]—*Arch f Schiffs- u Trop-Hyg* 1935 Aug Vol 39 No 8 pp 342-345 With 1 fig

Investigating different strains of *Plasmodium vivax* used in the treatment of general paralytics the author finds that the strains differ

from one another as regards the average incubation period, number of parasites present and number of merozoites produced per schizont. These and other differences seem to be present, regardless of the method of infection whether by inoculation of blood or by the bite of a mosquito so that they can be regarded as due to inherent characteristics of the strains in question.

C M W

JAMES (S. P.) Le paludisme par *Plasmodium ovale* [Plasmodium ovale]—*Riv d' Malariologia*. Sez II. 1935 Vol. 14 Suppl. to No. 3 pp. 27-31

It is useless to look for *P. ovale* in thick films. It is best to employ two thin ones—one deeply stained to show the changes in the corpuscles and the other lightly stained to show the character of the pigment and the morphology of the parasite. It is most important to have at hand typical stained specimens of the different species of malaria parasites for comparison—the comparison should be made with the help of a micrometer-eyepiece. It is almost impossible to identify *P. ovale* in the early ring form—in the half-developed stage and later it looks like a quartan parasite in an hypertrophied corpuscle spotted with Schüffner's dots. Comparison with a type specimen of quartan shows that there are differences in the pigment. An important point is the scalloped or fringed edge of the corpuscle. In the early stages of division the parasite is rounded and lies in the middle of a large oval corpuscle which is sometimes fringed. The stage of complete division is represented by 8 merozoites, surrounding a central block of pigment, lying in a corpuscle full of Schüffner's dots. (See the *Bulletin* 1936 Vol. 32, p. 737)

W F

CHANG (Y. H.) LI (C. C.) & YOUNG (M. P.) A Clinical and Laboratory Study of 196 Cases of Malaria.—*Chinese Med. J.* 1935, May Vol. 49 No. 5, pp. 477-478.

This study is based upon 196 cases of malaria in the Elizabeth Blake Hospital, Soochow. Subtertian, 63 per cent. was the most common. Liver damage was shown by the inability to store glycogen, as indicated by the high blood-sugar index 2 hours after a test meal. Albuminuria occurred in 20 per cent. of the subtertian cases and in 6 per cent. of the tertian cases. The case mortality was 1.5 per cent.

W F

UTTRLEY (K. H.) A Spleen Rate Survey in the Colony of Hongkong.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1935, July 31 Vol. 29 No 2 pp. 187-190

BOURGEOIS (P.) & NGUYEN VAN TAX Premier essai sur le paludisme à Soc trang—*Bull. Soc. Méd.-Chirurg. Indochine* 1935, Feb.-Mar. Vol. 13, No. 2 pp. 87-112. With 5 charts (1 folding)

DALLES (P.) Paludisme et grossesse. De leur influence réciproque. [Malaria and Pregnancy]—*Bull. Soc. Méd.-Chirurg. Indochine* 1935, May Vol. 13, No. 4 pp. 432-435

Parturition and abortion during the course of severe, acute or chronic, insufficiently treated malaria may be followed by collapse. Contrary to common belief parturition rarely brings on an attack in

cases of latent malaria. The author has found that Henry's reaction is often positive in the newly-born children of Indo-China and he concludes that congenital malaria is common though parasites are rarely found in the peripheral blood of the babies. W F

WICKRAMASURIYA (G A W) Some Observations on Malaria occurring in Association with Pregnancy With Special Reference to the Transplacental Passage of Parasites from the Maternal to the Foetal Circulation.—*Jl Obstet & Gynaecol Brit Empire* 1935 Oct. Vol. 42. No 5 pp 816-834 [14 refs.]

Six cases of congenital malaria are reported (1) Massive infection of placenta with subtertian parasites. A few parasites in blood from umbilical cord. Baby had rise of temperature on fifth day but the blood was not re-examined. (2) Massive subtertian infection of placenta intra uterine death of foetus parasites found in foetal brain and spleen (3) Placental infection intra uterine death of foetus parasites in foetal brain and spleen (4) Mother died from subtertian malaria malarial pigment but no parasites found in foetus. (5) Mother died from cerebral malaria subtertian parasites found in heart blood spleen and liver of child. (6) Mother died of malaria crescents found in blood from cord but none in foetal liver or spleen. W F

VAN NIJEN (René) Le paludisme chez l'enfant indigène.—*Ann Soc Belge de Med Trop* 1935 June 30 Vol. 15 No 2 pp 229-233 [13 refs.]

MILNE (J Coutts) Malaria Fresh Infections versus Relapses —*Malaria* Med Jl 1935 June Vol. 10 No 2 pp 49-50

ZAUM (F) Das Verhalten der Leber bei Malaria. (Eine zusammenfassende Uebersicht mit Untersuchungen) [The Liver Functions in Malaria.]—*Arch f Schiffs u Trop-Hyg* 1935 Sept. Vol. 39 No 9 pp 363-373 With 3 figs. [67 refs.]

A study of certain functional liver tests in cases of malaria. Attention was directed to the following — 1 Bloodsugar level. 2. The non-protein nitrogen of the blood. 3 The serumbilirubin and 4 The excretion of urobilin including urobilinogen. The author summarizes the work which has been done on these subjects including his own. He considers that in malaria a rise in level of the blood sugar suggests an indirect, general damage of an infectious-toxic nature to the liver the finding of serumbilirubin and urobilin indicates a slow mechanical and chemical damage a rise of the non protein nitrogen appears to be related to an increased protein destruction in the body He considers however that further investigations are required to clarify the position. He states that he finds contrary to some other investigators that the new drugs atobrin and plasmoquine cause no damage to liver function. E D W Greig

TRENSZ (F) Sur les propriétés antigéniques de l'hémazoïne. [Henry's Reaction. The Antigenic Properties of Haemozoïn.]—*Bull Soc Path Exot* 1935 July 10 Vol. 28. No 7 pp 558-560

It has no antigenic power Henry ascribes his reaction to the presence of antibodies in the blood of malaria patients which have resulted from the presence of

malaria pigment (haematozom) which has acted as an antigen in the body. Henry employs melanin as the antigen in his reaction instead of haematozom, although they are chemically distinct from one another. If Henry's reaction is, as he claims, a specific reaction between antigen and antibody haematozom should act even better than melanin. The author obtained haematozom from the liver and spleen of a fatal case of malaria. It did not give such good results as melanin when it was used in Henry's reaction. Numbers of rabbits were inoculated with haematozom in order to determine if antibodies were produced. The serum of these rabbits did not flocculate with the antigen, nor did the intradermal reaction following the inoculation of haematozom differ in any way from that in normal rabbits. The author concludes that haematozom does not act as an antigen. W F

PRUDHOMME (R. C.). Différents indicateurs remplaçant la mélâine dans la réaction de Henry [Henry's Reaction. Substitutes for Melanin as Indicators.]—*C. R. Soc. Biol.* 1935. Vol. 119 No. 5 pp. 1115-1117

The serum of malaria patients has no specific affinity for melanin which merely serves as an indicator of the instability of the serum in distilled water. Many other substances can be used with advantage in place of melanin and the author recommends a fine suspension of carmine in distilled water. W F

TREZZI (E.). De l'emploi d'une indamine choroidienne purifiée dans la sérofloculation palustre.—*Ann. Inst. Pasteur* 1935. Aug. Vol. 55 No. 2 pp. 208-228. With 1 chart. [15 refs.]

CHORINE (?) Flocculation et surflocculation dans la réaction de Henry.—*C. R. Soc. Biol.* 1935 Vol. 119 No. 27 pp. 1323-1328.

BRITISH MEDICAL JOURNAL 1935. Sept. 21 p. 552. Malaria and its Treatment.

Colonel JAMES, in opening a discussion at a meeting of the Chemistry Section of the British Association on September 9th, stated that although we disbursed annually nearly £500 000 on the purchase of quinine, yet our expenditure for malarial research amounted to barely a two-hundredth part of this sum. In Ceylon recently £20 000 was spent on the German drug, atebrol. In this country he said, there was a backwardness in research into the chemistry of antimalarial drugs. Professor R. ROBINSON stated that the research in England had now reached a stage where further progress was impossible without better facilities. Chemical and biological co-operation was necessary and a national institute for research in chemical therapy was needed, where chemists and biologists could work together. Professor SCHULEMANN said that he attributed the German successes with atebrol and plasmoquine to co-operation with biologists, and to the new animal tests devised by them. [It is generally accepted that atebrol and plasmoquine are much more likely to cause abdominal pain when they are given together than when they are given one after the other and in this discussion an authoritative statement was made by Professor Schulemann to the effect that this is actually the case.] W F

SOSILO (R.) & GILBERT (A. Ph. W.) Waarnemingen over chemische prophylaxis in een ernstig chronischendemisch malaariagebied. [Prophylactic Drug Treatment in a Hyperendemic Malaria Region.]—*Geneesk. Tijdschr. v. Nederl.-Indië* 1935 July 8 Vol. 75 No 14 pp 1141-1145

This trial of various remedies was made in the field on an alternate case basis. The total number of children involved was 175 of whom 40 were under and 135 over 3 years their spleen index amounted to 100 per cent, while the parasite index was 65.7 per cent. All the children received malaria tablets D V G (each containing 240 mgm. quinine sulphate and 2 mgm. plasmoquin) for one week in therapeutic doses after which the prophylactic trial began of the different test medicaments for a period of 15 weeks then came stoppage of the medication with continuance of examination of the parasite index for 28 weeks in all. The groups I II III IV with 43 44 43 and 45 children in each, received during their course of prophylactic (subtherapeutic) dosage on 3 days in the week $\frac{1}{2}$ -1 tablet (50 mgm.) atebrin $\frac{1}{2}$ -2 tablets (100 mgm.) quinine hydrochlorate $\frac{1}{2}$ -2 malaria tablets D V G and anti-beriberi vitamin tablets respectively. The last group was the control group of no antimalaria treatment. Table A gives the results of the first week of therapeutic treatment and the following 15 weeks of prophylactic treatment. It shows that—(1) The administration of daily therapeutic doses of D V G malaria tablets for 1 week had lowered the total parasitic index of 65.7 per cent. to 4.5 per cent. (2) The children of atebrin group I remained wholly parasite free. (3) Groups II (quinine) and III (D V G) were never completely free of parasites but had a much lower parasite index over the whole 15 weeks than before treatment was begun. (4) Control group IV (no treatment) had a consistently higher index than groups II and III but this was nevertheless lower than before the trial began. This lowering is ascribed to lessened chance of infection from the children of the other groups. (5) The great difference between the parasite index of the groups before therapy and during prophylaxis (not higher than 22.8 per cent) is ascribable to the action of the different preparations especially as the index in a neighbouring village at the end of the 12th week was 85.2 per cent. (6) D V G malaria tablets in the doses given had less effect than quinine hydrochloride. Table B shows that the stoppage of the prophylaxis resulted in a rise of the parasite index in all the test groups and that the continued action of atebrin for at least 2 weeks is not clearly proven. [D V G apparently stands for Dienst der Volksgesondheid and signifies the official malaria tablet.]

W F Harvey

BONNE (W M) & STOKER (W J) Prophylaxe bij malaaria (atebrine chinoplasmine en chinine). [Malaria Prophylaxis with Atebrin, Quinoplasmine and Quinine].—*Geneesk. Tijdschr. v. Nederl. Indië* 1935 June 11 Vol. 75 No. 12 pp 858-869 With 1 chart. English summary

All these drugs acted well as long as they were continued. When they were stopped there was more malaria than in the untreated control group Possible danger of acridine sensitization.

The experiments were made in the prison at Bangoredjo, Java. The prisoners were divided into four groups of 75 persons. The first group received one tablet of atebnin (0.1 gram) every evening; the second group one tablet of quinoplasmine (0.01 gram phenoquine and 0.3 gram, or 4½ grains, of quinine); the third group two tablets of quinine (0.4 gram or 8 grains); the fourth group was the control. The drugs were given for three months and this was followed by an observation period of two months. The results were as follows:—
Atebni group: no clinical case of malaria occurred during the three months. Parasites were found only twice at the weekly thick-film blood examination. Three weeks after the treatment had been stopped, the parasite index was no better than in the control group. There were no toxic symptoms, but, at the end of the treatment, every patient was stained yellow. This is objectionable from the standpoint of the patient; it also raises the question of the cumulation of atebnin, and the danger of hypersensitivity to the sun following the deposition of acridine in the skin. The van den Bergh reaction was negative, but positive reactions for urobilin in the urine were more numerous than in other groups. The **quinoplasmine group**: there were two clinical cases with 44 hospital days. The **quinine group**: there were 4 malaria cases, with 50 hospital days. The **control group**: 21 cases, with 243 hospital days. After the prophylaxis was finished the parasite index especially in the quinine group rose abnormally, probably as the result of many latent infections.

W F

DRUMMOND (R.) Prophylactic Quinine in Malaria in Nyasaland—South Africa. *JL* 1935 June 22 Vol. 9 No. 12 p. 417

MARAFIOT (Joaquin) PEREZ (Amando) & ROSSI (Paul F.) Philip-
pines Totaquina—Philippines. *JL* Sci. 1935 Mar. Vol. 55
No. 3 pp. 239-255 (With 2 folding figs. [22 refs.]

Cinchona with an excellent alkaloidal content can be cultivated in the Philippines and a satisfactory totaquina can be prepared locally and sold at a seventh of the present price of quinine.

The authors have made clinical tests with totaquina extracted at the Bureau of Science from the bark of cinchona trees grown by the Bureau of Forestry in Bulakdow Mindanao. The plantation was begun in 1927 with seeds obtained from Java, and there are now 38,000 trees consisting of *C. Ledgeriana*, *C. succirubra* and *C. hybrida*, on an area of some 35 acres, situated at an altitude of 2,500 feet, with an annual rainfall of 112 inches and a temperature ranging from 62° to 84°F. Some bark from 5-year-old trees has been analyzed with very satisfactory results. The percentage of alkaloids in the *C. Ledgeriana* bark was 9.6 per cent. as compared with 8.52 for India and 8.6 for Java. The yield for *C. hybrida* and *C. succirubra* was about 4.8 per cent. as compared with 6.25 and 7.7 per cent. for *C. succirubra* in India and Java, respectively.

The authors estimate that at least two million cases of malaria occur yearly in the Philippines and that 32,400 kilograms of quinine are needed on the basis of 250 grains per case per year. The amount of quinine actually imported is often less than 2,000 kilograms a year because the natives cannot afford to buy it.

“Refined quinine is, in fact, an expensive luxury, a rich man's remedy. Therefore, there is a very large field for the production of a still lower priced product, such as totaquina. There is a potential market in the

Philippines alone for more than 30 000 kilograms a year. It is required by malarious consumers who literally cannot afford to buy higher priced drugs. This estimated retail price of 20 43 pesos per kilogram of totaquina is higher than it would be if production were carried on commercially but it compares very favorably with the present retail price of 154 pesos for quinine sulphate—the totaquina could be sold to the people for something like one-seventh of the present price of quinine! In this case a 250-grain treatment would cost not 2 50 pesos as at present, but only about 35 centavos a price within the means of the malarious poor.

Successful clinical trials were made by the authors at the Iwahig Penal Colony Hospital with totaquina prepared locally from *Ledgeriana* bark grown in the islands.

W F

SERGENT (André) & VOIGT (P) Essais thérapeutiques du Totaquina effectués à l'hôpital de Marengo (Algier)—*Arch Inst Pasteur d'Algérie* 1935 June Vol. 13 No 2 pp 203-209 With 2 figs.

SAINTE-MARIE (Flye) Essais thérapeutiques du Totaquina effectués à l'hôpital Cocard à Fes (Maroc)—*Arch Inst Pasteur d'Algérie* 1935 June Vol. 13 No 2 pp 210-215 With 5 figs.

PETER (F M) The Clinical Testing of Malarial Remedies.—*Trans Roy Soc Trop Med & Hyg* 1935 June 29 Vol. 29 No 1 pp 41-50 With 2 charts. [23 refs.]

The author's original observations made in 1930 have been confirmed by experience.

The author was the first to test atebrin clinically this he did at the Malaria Research Station Gurbanesti Rumania, in 1930 [this *Bulletin* 1932, Vol. 29 p 705]. The present paper aims at showing how far these preliminary clinical tests on a few patients provided correct data regarding the scope of action of this drug. For the purposes of the original test two patients with benign tertian malaria and two with subtertian malaria contracted naturally were chosen, and also a third case of benign tertian which had been infected by inoculation. Films were made every three hours and the parasites were counted against leucocytes. The observations concerning the action and non toxic nature of atebrin which the author made in the course of these investigations have been abundantly confirmed in all parts of the world. It differs fundamentally from quinine and plasmoquine in its longer retention in the body. Atebrin is a dyestuff and its action on the parasites is in all probability a direct one. Atebrin has a marked affinity for the parasites to which it becomes very firmly bound on this account the amount required should be regulated by the number of parasites present rather than by the weight of the patient. Metabolism of the drug also plays a part in its action and this can vary even in the same patient at different times. It was observed in the experimental laboratories at Elberfeld some years ago that foodstuffs containing large quantities of cellulose absorbed atebrin, and diminished its therapeutic effect. Quantities of milk in the stomach are also said to hinder absorption. As regards individual prophylaxis unlike quinine and plasmoquine atebrin prolongs the incubation period, and 0.2 gram on 3 days of each week or doses of 0.05 to 0.1 gm. daily will give an effective clinical prophylaxis.

W F

CARMAN (J. A.) Atebrin, Plasmoquine and Quinine in the Treatment of Malaria.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1935. July 31 Vol. 29 No. 2 pp. 191-202.

Subtertian infections should be treated immediately. It is vain to hope for the development of immunity against it in European cases. Atebrin is as effective as quinine, and costs no more.

The author states that the primary object of this investigation was to ascertain the relative merits of atebrin and quinine in the treatment of malaria in Kenya, but a large part of his paper deals with the importance of treating cases of subtertian infections as early as possible. In the third General Report of the Malaria Commission of the League of Nations (this *Bulletin* 1933 Vol. 30 p. 837) it was stated that it is bad practice to begin the treatment of malaria infection at the commencement of the attack since this tends to prevent the development of an acquired immunity (see SOUTON & HARRISAGAWA above). The author considers that it is dangerous to postpone treatment, and that to wait for a patient to develop immunity is to risk his life. He does not believe that Europeans ever develop a useful immunity to subtertian malaria. As regards the parallel series of cases treated with different drugs, he found that quinine and atebrin were equally efficient in eliminating parasites. "Atebrin is cheaper in European practice than is quinine and although in treating Africans in hospital it appears to be less economical to use atebrin, it would almost certainly prove to be cheaper in the long run and in any case its use would enable a given number of beds to be utilised by 14 per cent more patients."

[Most medical men in the tropics will agree that the treatment of subtertian malaria should begin at the earliest moment, but with regard to the report of the Malaria Commission it should be remembered that it dealt with the subject "from the point of view of persons who are in a position to obtain expert medical advice and efficient care rather than from that of the mass of the population of malarious countries."]

IV F

FARINAUD (E.) L'emploi de l'atofrine dans la prophylaxie collective du paludisme dans les exploitations agricoles.—*Ann. de Med. et de Pharm. Colon.* 1935. Jan.-Feb.-Mar. Vol. 33. No. 1 pp. 136-138. With 1 chart.

DE LANGEN (C. D.) & STORM (C. J.) A Comparative Clinical and Experimental Study of the Action of Quinine, Plasmoquine and Atebrin.—*Indian J. Pathog. Bact.* 1935. Vol. 21. No. 2 pp. 27-56. [31 refs.]

SOMASUNDARAM (S.) Temperature Charts Illustrating the Action of Atebrin Mesonate Intramuscularly compared with Quinine dihydrochloride Intramuscularly in the Treatment of Malaria in Ceylon.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1935. July 31 Vol. 29. No. 2 pp. 103-104.

The therapeutic effects of the two drugs were approximately the same. Toxic effects of atebrin by the mouth are not uncommon.

A single injection of 0.375 gram of atebrin was found insufficient to control the disease and a standard treatment of two intramuscular injections with an interval of 24 hours has been adopted. Occasionally

it has been found necessary to give three injections. The fever and parasites disappear within 3 days. A control series was given two intramuscular injections of 15 grains of quinine followed by 22½ grains a day by the mouth. The author states that he has not found atebrin musonate in any way superior to quinine. Atebrin injections are painless while quinine injections are painful. Atebrin by the mouth frequently causes epigastric pain in children it may cause diarrhoea and vomiting. Symptoms of mental derangement lasting 2 or 3 days occurred in a fair number of the author's cases towards the end or after the completion of treatment.

W F

VAN SLYPE (W) Résultats cliniques obtenus par les atebrines dans le traitement du paludisme. [Atebrin In Malaria]—*Bruxelles Méd* 1935 July 14 Vol. 15 No 37 pp 1003-1009

Atebrin-musonate did not give very good results.

The author treated 54 patients with atebrin and he complains that he had to stop the treatment on several occasions because of vomiting and abdominal pains. [It appears more probable that these toxic symptoms were really due to the plasmoquine which was given with the atebrin]. In one case haemoglobinuria appeared after 0·9 gram of atebrin and 0·09 gram of plasmoquine had been given in three days. The atebrin was given in three forms (1) atebrin tablets (2) atebrin powder for injection intravenously or intramuscularly (3) atebrin musonate. A 10-centigram dose of atebrin powder dissolves readily in 5 cc. of water it acts promptly it is painless when injected and non-toxic. Atebrin musonate is still more soluble 12·5 centigrams are soluble in 3 cc. of water. It is much slower in its action than ordinary atebrin. In some of the cases treated, schizonts were still present after 10 days. The author recommends that it should be reserved for the treatment of chronic cases.

W F

HICKS (E. P.) Atebrin Musonate a Note on the Rate of Absorption and on the Local Effects of Intramuscular Injection.—*Records of the Malaria Survey of India* 1935 June Vol. 5 No 2 pp 203-206 [11 refs.]

A single dose of atebrin musonate was found to have no injurious action on the tissues of monkeys when injected intramuscularly in the strength recommended by the makers.

Atebrin musonate is the methyl sulphonic acid salt of atebrin. Ordinary atebrin is the dihydrochloride. Atebrin musonate is sold as Atebrin for injection and must be distinguished from Atebrin Tablets for Injection which consist of the dihydrochloride. Atebrin musonate a yellow powder is packed in ampullae labelled 0·1 and 0·3 gram respectively. These figures represent the content in terms of the more familiar atebrin dihydrochloride. The actual weights of atebrin musonate are 0·125 and 0·375 gram. The makers recommend that one of the smaller ampoules should be used for intravenous injection and one to three for intramuscular injection.

BLAZE and SIMEONS (this *Bulletin* 1935 Vol. 32 p 746) stated that they could control malaria by the intramuscular injection of one of the larger ampoules on each of two consecutive days. The author's experiments were made with *Silenus rhesus*. The drug was given by intramuscular injection to 8 monkeys by intravenous injection to 4

and by the mouth to 4. It appeared to be absorbed more quickly when it was injected. None of the monkeys showed any reaction at the site of injection except in one case where the solution was five times the strength recommended by the makers in this instance local congestion haemorrhage and oedema occurred. W F

ARMY (A. C.) Atebrin and Malaria. [Correspondence.]—*J. Roy Army Med Corps*. 1935. Sept. Vol. 65. No. 3. pp. 212-213.

This letter is a criticism of a report on 4 cases of benign tertian which relapsed after treatment with atebrin (see BIGGAR, this Bulletin 1935 Vol. 32, p. 745).

The author quotes a communication issued by Army Headquarters, India, on June 25th, 1934 on the results of atebrin-plasmochine treatment from April 1st, 1933. Among 1603 cases of benign tertian malaria 13·6 per cent. relapsed among 623 cases of subtertian malaria 11·3 per cent. relapsed. A considerable proportion of these were doubtless fresh infections. Atebrin 0·3 gram daily was given for 5 or 7 days and, then plasmochine 0·03 gram for a further 5 days. In the case of Indian troops, subsequent to September 1933 the dose of plasmochine was reduced to 0·02 gram and 0·01 gram on alternate days. The results with a 7-day course of atebrin were slightly better than with a 5-day course. In Bangalore, where there is no possibility of re-infection 112 cases were treated and none of them relapsed within a period of 2 years. In the Annual Report of the Medical Transactions 1934 Indian Military Hospital, Quetta, it was stated that all cases of malaria were treated with atebrin and plasmochine, and that the relapse rate was only 2 per cent. There is absolutely no proof the author says that atebrin increases the toxicity of plasmochine. [See reference above to SCHULEMANN's statement at meeting of British Association.] W F

DE NUSSO (Renato) La stimolazione antimonatale del s.r.e. come mezzo terapeutico nella malattia estivo-autunnale chinino-plasmochina-atebrin resistente. Nota preventiva. [Antimony in the Treatment of Resistant Malaria.]—*Reformas Med*. 1935. July 21. Vol. 51 No. 29 pp. 1087-1092. With 9 figs.

The author employed antimony injections with a view to stimulating the reticulo-endothelial system in patients suffering from malaria infection which had proved refractory to treatment by quinine, plasmochine and atebrin.

He found that the intravenous injection of antimony tartrate markedly stimulated the r.e. system in rabbits and then tried this drug in cases of human malaria. Details of four are given. He used a 1 per cent. solution in doubly distilled water sterilizing by heating to 100°C. for half an hour on three days. He gives on alternate days doses of 1, 2, 4, 6, 8, 10, 12 and 14 cc. Sometimes, if signs of intolerance of the larger doses appear the advance from 9 cc. is more gradual 10, 11, 12, 13, 14 cc. on alternate days. The early doses often being about "a true mobilization of the parasites" with febrile attacks, but after the fourth or fifth injection the spleen becomes rapidly smaller and by the end of the course has become normal. One patient was unable to tolerate the complete course of antimony but after he had received a total amount of 162·5 cgm. of the antimony

salt plasmoquin co brought about a cure within 3 weeks. If the first course is not sufficient a second starting at 10 cc. is given after 10-20 days interval.

H H S

HUFF (Clay G) Natural Immunity and Susceptibility of Culicine Mosquitoes to Avian Malaria.—*Amer Jl Trop Med* 1935 July Vol. 15 No 4 pp 427-434 With 1 fig [12 refs.]

In this paper the author refers to his observations on the susceptibility of culex mosquitoes to infection with bird malaria which have shown that races derived from mosquitoes of low susceptibility tend to contain individuals of low susceptibility while those derived from individuals of high susceptibility tend to contain individuals which are highly susceptible (this *Bulletin* 1932 Vol. 29 p 126). It is also pointed out that as the malarial parasite itself is bisexual the possibilities of the development of variations in it have also to be taken into account when considering the development in mosquitoes and other features of its life-history

C M Wenyon

MANWELL (Reginald D) How many Species of Avian Malaria Parasites are there?—*Amer Jl Trop Med* 1935 May Vol. 15 No 3 pp 265-282. With 49 figs. on 2 plates. [33 refs.]

This paper which is in many respects similar to a previous one on the same subject by GIOVANNOLA (this *Bulletin* 1935 Vol. 32 p 122) reviews the present position of knowledge regarding species of avian malarial parasites. The conclusion reached is that though there may actually be more than seven species only this number have been sufficiently studied to make their existence as separate species certain. These fall into two groups forms with rounded gametocytes (*P. cathemerium* and *P. praecox (relictum)*) and forms with elongate gametocytes (*P. circumflexum* *P. elongatum* *P. nucleophilum* *P. rouxi* and *P. vaughani*). It is probable that *P. capistrans* and *P. wanilewskyi* with round gametocytes and *P. polars* with elongate gametocytes are also good species while the specificity is questionable owing to incomplete description in the case of *P. binuriae* *P. fallax* *P. major* *P. majoris* and *P. tumbayensis*. The paper contains a great deal of detailed information while the synonymy of a number of names is discussed. Two of the forms *P. nucleophilum* and *P. polars* are new species. Two plates in black and white illustrate the characters of the various parasites.

C M W

DEMIDOWA (L. W) Ueber die geringste zur Erzeugung der experimentellen Malaria nötige *Plasmodium praecox* Zahl. I Mitteilung [The Smallest Number of *Plasmodium praecox* necessary to give rise to Malaria experimentally]—*Giorn. d. Batter e Immunol* 1934 Nov Vol. 13 No 5 pp 872-877 [19 refs.] English summary (4 lines)

By means of the micromanipulation and dark field observation of the blood corpuscles the author has been able to inject known numbers of malaria-infected red blood corpuscles into birds. With 50 corpuscles infected with *Plasmodium praecox* 20 birds were inoculated with development of infection in 5 after 11 to 20 days. With 25 infected corpuscles 40 birds were inoculated resulting in infection in 3 after (v)

10 to 19 days. With 10 infected corpuscles 45 were inoculated, followed by infection in 2 after 11 to 21 days. With 5 corpuscles 30 were inoculated, followed by infection in 2 after 15 and 18 days. Finally 70 birds received only a single infected corpuscle resulting in infection in 2 after 14 and 52 days. In another experiment 4 birds received a single corpuscle infected with *P. cathemerium*. Of these one became infected after 5 days. The experiments with *P. ferox* show that by reducing the dose of infective material the normal incubation period of 5-7 days became prolonged to 10-52 days. It is admitted that in these experiments each infected cell may have contained more than one parasite as it is not possible to distinguish multiple infections from single ones by means of the dark field microscope. C M W

LÉGROUX (R.) & LVOFF (André) La schizogonie régressive des gamétoцитes femelles d'*Haemoproteus paddei* [Regressive Schizogony of the Female Gametocyte of *H. paddei*]—Bull Soc Path Exot 1935 Apr 10. Vol 28. No. 4 p. 277

In 1924 the authors saw appearances in *Haemoproteus paddei* of the Java sparrow which they interpreted as the much disputed schizogony of the female gametocyte. Subsequently the discovery of *Plasmodium paddei* in the same host suggested to BROWNE (ibid Bulletin 1935 Vol 32, p 658) that the forms of the *H. paddei* resembling schizogony were actually schizonts of *P. paddei*. The authors now refute this suggestion though they rightly point out that experimental work alone will finally settle the question. C M W

COATNEY (G. Robert) The Effect of Atebrin and Plasmoquine on the Haemoproteus Infection of the Pigeon.—Amer Jl Hyg 1936 Mar Vol 21 No. 2 pp 249-259

Both atebrin and plasmoquine were tested on *Haemoproteus columbae* of the pigeon the infections employed being the primary ones contracted naturally in the dove-cote. The tolerated doses of the drugs given orally were 40 mgm. of atebrin and 10 mgm. of plasmoquine a day. The conclusion reached is that atebrin inhibits the growth of the young gametocytes and prevents their maturation for at least 55 days. Though the adult gametocytes are altered morphologically atebrin removes them with difficulty. On the other hand plasmoquine does not prevent the development of the gametocytes for more than 15 days but rapidly brings about the disappearance of the adult gametocytes. Neither drug appears to have any effect on the schizonts as judged by the regular occurrence of relapses. C M W

SINTON (J. A.) The Malarial Parasites of the Oriental Monkey *Siemens rhesus*.—Reprinted from Current Science 1934 Aug Vol. 3. No. 2 pp. 48-50.

As has been noted in various other papers, the work carried out by Sinton and his colleagues under the Malaria Survey of India has shown that the oriental monkey *Siemens rhesus* is liable to infection with three species of malarial parasite, all of which are easily transmissible to *Siemens rhesus* by blood inoculation. These parasites are *P. knowlesi* Sinton & Mulligan 1932 (24-hour cycle), *P. cynomolgi*, Mayer 1907 (48-hour cycle) and *P. vivax* Halberstaedter & Howard, 1907 (72-hour cycle). It is noted that pure infections of these are being maintained at the laboratories at Kasauli. C M W

GHOSH (B N) & SINTON (J A.) Quantitative Changes in the Proteins of the Blood Sera of Monkeys infected with Malarial Plasmodia.—*Records of the Malaria Survey of India* 1935 June Vol 5 No 2 pp 173-202 With 6 graphs [47 refs.]

The authors after discussing the work of various observers on the subject of the protein changes which occur in the serum in human malaria conclude that the results indicate that malarial attacks cause a distinct fall in total blood proteins, which is most marked in the albumin fraction. Though there seems to be some doubt regarding the globulin fraction there is a general consensus of opinion that the globulin albumin ratio is raised. After the attack there is a tendency for the proteins to return to their normal level. In chronic infections the same changes occur but are less marked. In order to gain further insight into the question it was decided to investigate the blood changes in monkey malaria infections caused by *Plasmodium knowlesi*, *P. cynomolgi* and *P. vivax*. The general results indicate a close parallel to what has been found in human malaria. It is noteworthy that the changes are more pronounced with the more acute *P. knowlesi* infection than with the other milder ones. The return of the blood to normal after an attack appears to be accelerated by treatment with quinine, atebrin, plasmoquine or stovarsol. It seems that the disturbance is the result of the effect of the infectors on the reticuloendothelial system

C M W

GERACITANO (Arturo) Ulteriore contributo allo studio dell'emozoina malarica. [Further Contribution regarding Malarial Haemoglobin.]—*Riforma Med* 1935 July 19 Vol 51 No 28 pp 1058, 1061-1062 With 5 figs [17 refs.]

The author continues his study of the optical and chemical characters of malaria pigment. He shows that in all three forms (not in *P. vivax* infection only) with crossed Nicol prisms near and between the doubly refractive granules there are others optically inactive and he has proved that these consist of the same pigment. Subjection of the pigment to the action of alcohol, peroxide of hydrogen or hydrochloric acid does not change the double refractivity. It is worthy of note he states that malarial pigment, which is optically active to polarized light is related to and resembles the haemin crystals of blood

H H S

JACKSON (R.) Sur deux cas d'infection naturelle par l'hématozoaire du paludisme de *A. splendidus* (*A. maculipalpis*) dans la colonie de Hong Kong [The Natural Infection of *A. splendidus* (*A. maculipalpis*) in Hong Kong]—*Bull Soc Path Exot* 1935 June 12 Vol 28 No 6 pp 446-448.

The author has found two specimens with gut infections one with 15 cysts of about 10 μ diameter the other with 12 measuring about 40 μ . They were caught in a construction camp at Shing Mun on the mainland, where the rate of infection of the principal carriers was very high. The figures were as follows—

A. minimus examined 2,155 infected 12.48 per cent. *A. jayporensis* examined 10,936 infected 9.93 per cent. *A. maculatus* examined 230 infected 3.48 per cent. *A. kirkensis* examined 2,818, infected 1.21 per cent.

W F

MATHIS (Maurice) Cycle biologique complet d'*Anopheles gambiae* Giles élevé en série au laboratoire. [The Complete Life-Cycle of *Anopheles gambiae* realized in the Laboratory]—C. R. Soc. Biol. 1935 Vol. 119 No. 27 pp. 1385-1386

The author bred *A. gambiae* in small cages measuring only 18 x 18 x 25 centimetres. The water for the larvae was rich in Proteococcus and was further enriched with a sterile culture of *Euglena crenata*. The eggs hatched in 36 to 40 hours the larvae became pupae in 5 to 8 days adults appeared 24 hours later fecundation took place quite readily in the small cages on the same evening the females were ready to bite almost at once the first eggs were deposited about 6 hours after the feed. The whole cycle from egg to egg occupied about a fortnight. The author has successfully carried on a strain of *A. gambiae* at Dakar in Senegal, through 5 generations, between 29th April and 14th July 1935. The temperature was 24-26°C. This has provided him with several thousand mosquitoes. W F

BORN (Mark F.) STRATMAN THOMAS (Warren K.) & KITCHEN (S. F.) On the Relative Susceptibility of *Anopheles quadrimaculatus* to *Plasmodium vivax* and *Plasmodium falciparum*.—Amer. J. Trop. Med. 1935. July Vol. 15 No. 4 pp. 485-493

When the gametocyte density is high, *Anopheles quadrimaculatus* can be infected in approximately the same degree with either *P. vivax* or *P. falciparum* but when the gametocyte density is low infection with *P. vivax* occurs more readily. One male and one female gametocyte to 100 leucocytes marks the nominal practical limit for the infection of *A. quadrimaculatus* with *P. vivax* but the minimal density in the case of *P. falciparum* is 11 gametocytes of each sex to 100 leucocytes. The authors incline to the opinion that the differences noted may more properly be attributed to characteristics of the parasites themselves than to a differential susceptibility on the part of *A. quadrimaculatus*. W F

DE BUCK (A.) Infection Experiments with Quarten Malaria.—Acta Trop. Med. & Parasit. 1935 July 17 Vol. 29 No. 2 pp. 171-175 [10 refs.]

A fair percentage of gland infections was obtained with one batch of *A. maculipennis* the results with other batches were very poor.

These experiments were carried out in Amsterdam with a quarten strain obtained from Vienna. Wild *A. maculipennis* var. *strobiformis* which had been caught in stables were fed on two patients who had been inoculated with this strain. The number of male gametocytes in the blood at the time of feeding was 6 per 500 leucocytes, or somewhat over the density of 1 per 100 which the author considers the minimum concentration for practical use. The result was unexpectedly successful for out of 45 mosquitoes which were dissected 12 showed gland infections. The experiment was repeated several times, but the same good results were not obtained. In one batch, 5 gland infections were found in 56 mosquitoes dissected, but in other batches there were no infections beyond a few oöcysts in the gut. "The only reasonable explanation seems to be that the number of gametocytes in the patient's blood was sufficient but that the bad results in the

other mosquitoes are caused by something in the physiology of their stomachs. Experiments made with *A. bifurcatus* gave the same bad results. The extrinsic incubation was 15 days the intrinsic incubation in man was 25 days. The Vienna strain of malaria quartana develops only in rare cases a sufficient number of gametocytes to infect mosquitoes successfully

W F

BISHOP (F C.) Mosquito Control Work of To-day—*Jl. Econom Entom* 1935 June. Vol. 28. No 3 pp 620-627

While passing reference is made to other parts of the world in which effective mosquito control has been carried out this paper is concerned with what has been done in the United States of America where in certain areas the problem has been tackled in a wholesale manner under Federal or State supervision and support. Non-malaria carrying as well as malarial mosquitoes have received attention the former in 32 States and the District of Columbia the latter in 14 States. The assumption by the Civil Works Administration in December 1933 of responsibility under both headings gave a great stimulus to operations which in nearly all the Southern States had already been in progress for a long time. That extensive mosquito control may also afford at least temporary relief to unemployment is shown by the fact that in the 14 States already mentioned the monthly average of men employed for some 4 months in ditching and draining was 64 000 while the maximum number of labourers at work during any week of this period was 120 000.

The author pleads for further research into the bionomics and ecology of mosquitoes as also their relation to virus diseases such as encephalomyelitis in man and animals.

E E Austin

- i. DE BUCK (A.) & SWELLENGREBEL (N. H.) The Salivary Glands in Hibernating *Anopheles maculipennis* var *messeae* and Semi-hibernating *Anopheles maculipennis* var *atroparvus*—Reprinted from *Proc Roy Acad Amsterdam* 1935 Vol. 38. No 4 pp 452-454 With 3 figs. on 1 plate.
- ii. — & — Further Studies on, and Discussion of the Results of Crossmating the Races (Varieties) of *Anopheles maculipennis* —*Ibid* No 5 pp 553-558 With 6 figs. on 2 plates.

i. In villages to the north of Amsterdam in attics wherein people sleep both varieties mentioned in the title occur in autumn and winter *messeae* because of the lowness of the temperature in such places, *atroparvus* on account of the facilities for feeding. Once there *messeae* remains fasting while *atroparvus* takes a meal of blood at intervals. Thus though the environment is the same the two varieties behave differently. Examination of the salivary glands affords a means of identification. In *messeae* the glands are typically rod shaped, and frequently contain masses of needle like crystals in the lateral lobes in typical *atroparvus* the glands are club-shaped, and devoid of crystals.

ii. In order to check the results described in a previous paper [this *Bulletin* 1935 Vol. 32 p 137] the authors repeated their experiments in crossmating the varieties of *A. maculipennis* which occur in Holland, namely *atroparvus messeae* and *typicus* using adults reared in Amsterdam from ova collected in Sweden. These responded to

attempts at hybridisation in exactly the same manner as specimens collected in Holland and in Italy." Crossing (both ways) *strobifera* and *maccusae* and crossing female *strobifera* with male *typica* did not result in viable larvae. On the other hand, by crossing male *strobifera* with female *typica* there was produced a first filial generation, which was sterile.

E. E. A.

DE BUCK (A.) & SWELLEN-GREBEL (V. H.). On the Seasonal Longevity of *Anopheles maculipennis* in Holland with Reference to their Ability to act as Malaria Vectors.—Reprinted from Proc. Kon. Acad. Amsterdam. 1933 Vol. 38. No. 3 pp 333-343. With 3 diagrams.

The scarcity of summer infections in anophelines is not due to stabular attraction only but also to the short life of summer generations. Heavily infected mosquitoes live the shortest time.

JAMES NICOL & SAUTÉ have shown that the early summer is not favourable to malaria transmission because it is not favourable to the longevity of infected anophelines. It is not favourable to their longevity because this is a period of sexual activity which endangers life by ovulation and long flights. It was formerly thought that the difficulty of finding anophelines in houses in Holland during the summer was due to their being attracted to stables. JAMES's observations admit of a different interpretation.

Observations made by the authors gave results which agreed with those of JAMES. "A favourable season from September till December (rate of survival 59 per cent.) an unfavourable one from April till August (rate of survival 15 per cent.) joined by a period of transition in January-March (rate of survival 32 per cent.) The sporozoite rates of anophelines infected within these three periods are about the same viz. 74, 70 and 71 per cent. respectively. So the summer mosquitoes are indifferent malaria vectors not because they are bad carriers but because they are too short-lived." Except in the winter months laboratory bred mosquitoes live much longer than wild ones. The latter are weakened by the wear and tear of an outdoor life during the period of sexual activity. This confirms JAMES's views on the special importance as malaria vectors of anophelines protected from the dangers of an outdoor life. The author found "that there exists a greater mortality in heavily infected mosquitoes than in slightly infected ones. Whatever the cause may be of this increased mortality it is acting only during the unfavourable season of February-August and it affects the mosquitoes suffering from a salivary infection. Intestinal infection alone however severe, does no apparent harm."

W. F.

GALLIARD (H.) & SAUTÉ (J.). Nouvelle contribution à l'étude de l'anophélisme en Corse. Les variations saisonnières de l'indice maxillaire. [Anophelism in Corsica—the Seasonal Variations in the Maxillary Index].—Bull. Soc. Path. Exot. 1933 June 12. Vol. 28. No. 6. pp. 453-458. With 2 figs. on 1 plate.

In Corsica by far the most important vectors of malaria are *Anopheles maculipennis* var. *lebranchii* and *A. pseudopunctipennis* (*A. distans*) which in certain parts of the island exhibit seasonal instability as regards the maxillary index. During the summer when malaria is epidemic, the

mean maxillary index was found to be between 12 and 14 whereas in winter in two successive years it fluctuated between 13 and 16. Such variation would seem to be connected with changes in the breeding places, partly seasonal partly (in one instance) due to pumping. As already remarked by ROUBAUD with regard to the race of *A. maculipennis* in Vendée whose zoophily is unstable — a rise in the mean maxillary index corresponds to the diminution of water surfaces conversely the lowering of the index will be related to a marked extension of the latter. In September when breeding places exhibit their maximum reduction before the first rains competition among larvae is intense and it is possible that the only individuals to complete their development will be such as are stronger than their fellows. Hibernating females thus produced will, according to ROUBAUD's hypothesis, have a high maxillary index. In Holland on the other hand, according to DE BUCK, SCHOUTE & SWELLENGRUBEL the reverse is the case and a rise in the maxillary index is observed when the winter generation gives place to that of summer. This difference, however, may be partly climatic and partly due to the fact that the Dutch races of *A. maculipennis* all have a very high maxillary index besides contrasting with the southern races in many biological respects. An unstable anopheline fauna whose reactions in default of prolonged study cannot be foreseen is dangerous. Where such exists in a malarious region hasty and incomplete interference with water-surfaces may be inadvisable. E E A

WASSILIEFF (A.) Étude de quelques gîtes d'anophèles tunisiens [Some Breeding Places of Tunisian Anopholes]—Arch. Inst. Pasteur de Tunis 1935 Apr Vol. 24 No 2 pp 352-359

The author has studied and made collections in two permanent Anopheles breeding places in Tunis. In one part of the Oued Bezirk the water is fresh the mosquito is *A. maculipennis* and its larvae were found in abundance among an aquatic plant community consisting of seven species the names of which are given. In the other the Bekalta drains the water is brackish the mosquito is *A. hispaniola* and the plant association consists of only three species which are different from those in the Oued Bezirk. The single feature common to the two plant communities is that their leaves are finely divided so that they form a network in the water. In the localities mentioned the antilarval campaign should concentrate on the eradication of aquatic plants the suppression of amphibious plants growing along the edge of the water is less important, and oiling should follow the uprooting of the others. The finding of larvae of *A. hispaniola* in different stages of development during November and December indicates the advisability where this mosquito occurs of not discontinuing antilarval measures even in winter. E E A

SERGENT (Etienne) Quelques remarques sur les espaces intercostaux et les columelles des œufs d'*Anopheles maculipennis* [The Intercostal Spaces and the Columellæ in the Eggs of *Anopheles maculipennis*]—Arch. Inst. Pasteur d'Algérie 1935 June Vol. 13 No 2 pp 184-187 With 17 figs. on 5 plates.

The author has examined, compared and photographed samples from 144 batches of eggs of Algerian *A. maculipennis* var *labranchiae* and has similarly studied eggs laid by French representatives of vars

atroparvus and *maccus* as furnished by 162 batches produced by the former and three deposited by the latter in Lounoum and Gantil. The brief paper under review provides a commentary on the excellent, untouched photographs with which it is illustrated. In the determination of the varieties of *A. maculipennis* HACKER & Masson have attached a certain importance to the appearance of the intercostal membrane in the floats on the eggs, and the forms of wrinkling of this membrane exhibited by the varieties mentioned above are displayed in the plates. As is only to be expected, the markings in question do not provide absolutely distinctive characters, and in eggs of var. *atroparvus* the intercostal spaces may be either wrinkled or smooth. On the other hand, photographs of portions of the outer surface of the egg-floats in the same variety and in var. *Lebreuilii* show a similar kind of network, formed by longitudinal wrinkles. The illustrations of the columellae (or as the author would prefer to term them, the papillæ) in the eggs of vars. *Lebreuilii* and *atroparvus* agree with the descriptions in "Instructions for the Determination of the Varieties of *Anopheles maculipennis*" issued by the Malaria Commission of the League of Nations. E. E. A.

- i. CORRIGEV (E.). Quelques observations sur le comportement des anophèles dans leurs abris diurnes en Algérie. [The Behavior of Anophèles in their Diurnal Shelters in Algeria.]—Arch. Inst. Pasteur d'Algérie 1935, June, Vol. 13, No. 2, pp. 183-191.
 ii. — Observations sur les gîtes à anophélines dans le département d'Alger en 1934. [Anophelinae Breeding-Places in the Department of Algiers, in 1934.]—Ibid., pp. 192-200. With 1 chart.

i. With the object of testing the effect of antilarval measures, and in order to secure specimens for laboratory purposes, the author in 1934 paid frequent visits to certain dark cow-sheds in the vicinity of Halloa Lake and Rhégâa Marsh, important breeding-places of *Anopheles maculipennis*. In these shelters unoccupied by day the insects were found resting on the underside of roofing tiles, on rafters, or on the upper part of the walls especially as so often happens, on dusty cobwebs. Almost all were females, gorged with blood, and eggs subsequently deposited were exclusively of the *Lebreuilii* type. Males, seen rarely at the beginning of spring, were never met with again even though the breeding places were but a few hundred metres away. No *Anopheles* were found among vegetation in the surrounding open country. As in the British Isles a summer and an autumn brood would appear to be produced. Individuals belonging to the former were found from the latter end of May or beginning of June until August, while those of the autumnal series were in occupation of the sheds from the commencement of October until the end of the following month or even of December. At the outset of the hot weather as also in autumn, the insects were found chiefly in the upper parts of the cow-sheds, near the roof. At the end of June, when they were most numerous, they extended on to the walls, but did not descend lower than about 1½ metre from the ground. With a damp sea-breeze from the north-east the shelters were well occupied. On the other hand, when the sirocco the dry wind from the south, was blowing, it was seldom that even a few insects could be found, and the sheds were deserted for some time afterwards. In June, at the beginning

of the hot weather when the sun was most powerful captures could be made with ease but in December the insects seemed more wide-awake and frequently took flight so soon as a beam of light fell upon them.

ii. The year 1934 in Algeria was marked by an abnormal rainfall resulting in a considerable extension of permanent *Anopheles* breeding places and an unusual persistence of temporary ones. Details are given with regard to breeding-places of *Anopheles masteri* A. *bisulcatus* A. *hispaniola* A. *maculipennis* and A. *algeriensis*. The early stages of the last mentioned species had not previously been met with by the author but in 1934 he took larvae and pupae in two different localities near the seashore.

In the case of A. *maculipennis* breeding began very late and it was not until the beginning of June that the first larvae were found the influence of the water régime being shown by the fact that captures were made at about the same time in all districts. Generally speaking larvae persisted until the end of November and a breeding place on the seashore, which had formed again in the autumn still contained larvae at the close of December. In 1934 larvae of A. *maculipennis* often alone but sometimes associated with those of other species of the genus were encountered in almost every breeding place examined.

E E A

DE MELLON (Botha) Entomological Studies. Studies on Insects of Medical Importance in South Africa—Part II.—Publications of South African Inst Med Res 1935 Mar Vol. 6. No 35 pp 323-365 With 10 plates.

The first portion of this paper is concerned with Simuliidae. There follows after records of mosquitoes found in the Cape Province an account of experiments with *Anopheles funestus* an essentially anthropophilic species. When a native in an infested area was made to pass the night in an open-ended mosquito-proof tent through which a gentle breeze was caused to blow 60 A. *funestus* were caught on the gauze protecting the leeward end but none on that covering the other showing that the insects found the host by smell. Two further series of similar experiments, each lasting eight days during which the native was receiving doses of sulphur with the object of disguising his odour showed that the ingestion of sulphur some of which is excreted through the skin and so presumably disguises the body odour of the host reduced the number of A. *funestus* which visited the tent in order to feed. When the host after being carefully deodorized was sprayed with caprylic alcohol, apparently an essential feature of goat odour before being placed in the experimental tent A. *funestus* ignored his presence for three successive nights and the simple deodorizing of the host with odourless soap and water followed by the application of weak hypochlorite solution, proved nearly as effective the total bag of A. *funestus* on three successive nights being in this case 11 in the experimental as compared with 69 in the control tent. The author's conclusion is that immunity from mosquito bites may possibly be secured either by the application of some odourless substance (thus avoiding the use of strong-smelling and to some people objectionable citronella) or by ingestion of something which, when excreted through the skin will neutralize the body odours without giving the body an additional smell.

In a brief concluding section anatomical and bromonical reasons are given for thinking that *A. sinensis* subsp. *lessoni* is really a distinct species, which on the other hand, as shown by certain adult and larval characters, is also distinct from the Oriental *A. fumiferana*. E. E. A.

- i. TREILLARD (M.) Domesticité périodique et périodicité de la pullulation chez les anophèles extrême-orientaux. Remarques sur ses modalités, ses causes et son utilisation. [Periodic Domesticity and Abundance of Far Eastern Anophelites their Characteristics, Causes and Utilization.]—Bull. Soc. Path. Exot. 1931 June 12 Vol. 29. No 6 pp. 448-450

- ii. — Influence des facteurs externes sur la biologie des larves d'anophèles. I. Surface volume, profondeur de l'eau et développement des larves de *Pseudomyzomyza subpicta*. [Influence of External Factors on the Biology of Anophelites Larvae. I. Surface, Volume and Depth of Water and the Development of Larvae of *Anopheles subpictus*.]—Ibid. pp. 451-452.

i. One of the chief objections likely to be urged against an anti-adult mosquito campaign is that it can only affect a relatively limited number of insects representing at best a more or less important fraction of the total anopheline population. But, unless hopes are vitiated by wholesale outdoor migratory movements of adult anophelines, it should be possible by choosing the moment or moments when the numbers of domestic mosquitoes are lowest, to effect what will amount to a large-scale destruction of the anopheline population. In the case of *Anopheles sinensis* which is so formidable a vector of malaria in the Far East, migrations of the character referred to have not yet been demonstrated. In view therefore of its domesticity, anthropophily and individual longevity and of the duration of the period when it is on the wing, it can be attacked with success indoors while its numbers are relatively low although, as already pointed out by the author [this Bulletin 1931 Vol. 31 p. 719] owing to the nature of its breeding places antilarval measures against it may be difficult.

ii. Among the various kinds of breeding places selected by *A. subpictus* which is fairly widely distributed in the Far East, small household collections of water are most frequently chosen. The author has noted the results of placing twenty young larvae of this species separately in each of four series of small containers, the respective diameters of which were 1.5 1.5 9 and 9 cm. and the heights 0.5 4 0.5 and 4 cm. Not only the exposed surface and the depth of water thus varied, but also the volume, the latter ranging from some 2 cc. in the smallest receptacles to about 100 cc. in the largest. Other conditions, including temperature and food-supply were the same throughout. Results, to be published in detail later are given in concentrated form and it is noted that the same type of rearing receptacle did not prove equally favourable to both pupae and larvae, either as regards number developing or time occupied. Receptacles belonging to Series I i.e. the smallest, produced the largest number of adults in the shortest time, and were closely followed in this respect by Series III. It would seem that the experimental results described, which show the benefit arising from the disposition of a certain quantity of water are in accordance with conditions observed fairly often in the natural breeding places of *A. subpictus*.

E. E. A.

SOESILO (R.) The *Hyrcanus (Sinensis)* Problem in Java. (Preliminary Report.)—*Meded Dienst d Volksgezondheid in Nederl Indië* 1935 Vol. 24 No. 2 pp 68-71

This concerns the important part played by *A. hyrcanus* in an epidemic on the Pamanocean and Tjerasern lands near Soembang in Java. WALCH was the first to describe a *hyrcanus* epidemic it occurred on the east coast of Sumatra in 1921. In some parts of the interior it is the most important carrier. WALCH subjected specimens from various parts of the archipelago to the precipitin test. He found that about 85 per cent contained human blood and that the presence or absence of cattle made little difference [See SWELLENGREBEL above where it is stated that *hyrcanus* is not a carrier in the rice fields of Java though it is present in great numbers] W F

BAISAS (F E) Notes on Philippine Mosquitoes II. *Uranotaenia* Group.—*Philippine Jl Sci* 1935 May Vol. 57 No 1 pp 63-80 With 4 plates & 1 fig [27 refs.]

BAISAS (F E.) Notes on Philippine Mosquitoes III Genus *Culex* Groups *Lophoceratomyia* *Mochthogenes* and *Neoculex*.—*Philippine Jl Sci* 1935 June Vol. 57 No 2 pp 167-179 With 2 figs & 4 plates [20 refs.]

Hirsch (Hans E.) A Note on making Permanent Preparations of Anopheline Mid-Guts.—*Amer Jl Hyg* 1935 Sept. Vol. 22 No 2 pp 278-282. With 5 figs

LING (L. C.) Field Observations on Malaria Control Measures in Singapore and Java.—*Chinese Med Jl* 1935 June Vol. 49 No 6 pp 562-569 With 9 figs.

The antimalaria budget for Singapore Municipality is given and the method of controlling malaria in the rice fields of Java is described.

With the help of a fellowship given by the League of Nations the author attended the malaria course arranged by the Health Organization of the League at Singapore in 1934. The course lasted two months. It consisted of laboratory work and practical field study and was attended by 27 students who were divided into two parties one of which studied field work in Malaya and the other in Java. The author describes his experiences in Singapore and Java. The budget for antimalaria work in the municipal area of Singapore for the year 1934 was 71 150 Straits dollars (£8,300) of which \$43 685 was for coolies wages \$20 335 for equipment and materials \$7 130 for salaries of inspectors. The municipal area has a radius of 5 miles with a population of about half a million. In Java, the malaria of rice fields is carried by *A. acomitus* in Sumatra, it is carried by *A. hyrcanus* var *sinensis*. The incidence of these mosquitoes has been reduced by attention to the grass and the water. The period of irrigation has been shortened the inlet and outlet of water has been better controlled the farmers are allowed to plant only one crop of rice instead of two and that must be done at a fixed time during the wet season they are made to keep the irrigation ditches free from grass. Free quinine is distributed during epidemics. These measures have achieved remarkable success in the Tjihea Plain of Western

Java, where rice fields had been abandoned because of their unhealthiness the spleen index has dropped in 3 years from 100 per cent. to almost nothing the population has increased by 30 per cent. and a rice of better quality which sells at a higher price has been produced. The author also describes the methods by which breeding in fish ponds is controlled. (See this Bulletin 1935 Vol. 32, p. 799 and 1930 Vol. 27 p. 640) 17 F

GINSBURG (J. M.) Mosquito Larvicides.—*Proc. N. J. Mosq. Expt. Assoc.* 1934 p. 121 [Summarized in *Dept. Scienc. & Indus. Res. Water Pollution Research. Summary of Current Literature* 1935 Sept Vol. 8 No. 9 pp. 297-298.]

A stable stock emulsion suitable for use as a larvicide in fresh waters and waters of less than 5 per cent. salinity is prepared by emulsifying a mixture of kerosene-pyrethrum extract (obtained by treating 2 lb pyrethrum flowers with 2 gal. kerosene) 1 gal. water, and 8 or 40 per cent. liquid coconut oil soap. The emulsion mixed with 10 parts of water kills mosquito larvae but is not injurious to fish plants or water fowl. The pyrethrum does not remain toxic after 48 hours. An emulsion suitable for use on waters of more than 5 per cent. salinity is prepared by adding a mixture of 2 oz. creosote acid and 2 gal. kerosene-pyrethrum extract to a mixture of 1 lb. powdered skim milk in 1 gal. water. Diluted with 10 parts water, this larvicide has no effect on goldfish and water fowl but causes slight injury to young leaves of aquatic plants. Both larvicides are equally effective against mosquito pupae and larvae when used at a rate of 50 gal. or more per acre. On account of insufficient spreading and penetration the pyrethrum larvicides are less effective than oil on waters covered with vegetation and debris filter beds heavily charged with sewage and scum, salt water covered with scum and places where the more permanent effect of oil is necessary under other conditions they are as effective as oil. Soap in a concentration of 0.2 per cent. or more completely destroys mosquito larvae and pupae.

RIMBAUT (G.) & MATTHIS (Maurice) Utilisation des "poissons millions" pour la lutte biologique contre les larves d'anophèles à Dakar [The Successful Employment of "Millions" at Dakar]—*Bull. Soc. Path. Exot.* 1935 July 10 Vol. 28 No. 7 pp. 575-577

These small fish are native to the northern part of South America and the Lesser Antilles. They are very small, the females measuring only 5 cm. and they are very prolific and bring forth 30 to 60 young every month which themselves attain to maturity a couple of months later. Conditions at Dakar are favourable to these little fish, and three couples brought from the Pasteur Institute in Paris multiplied rapidly. Dakar is surrounded with vegetable gardens containing innumerable wells which however useful they may be to the market-gardeners, serve as a chain of anopheline breeding places round the settlement. Ten fish were put into one of these wells, a shallow pool excavated in the sandy soil, and the contents of 10 dips of the net were counted daily. On the first day there were 1,500 larvae and 10 fish, on the fourth 604 larvae, on the fifteenth, 206 larvae

on the twenty nmth 0 larvae and about 600 fish. The gardeners welcome the use of millions in preference to oiling and it is cheaper

W F

DEARBORN (F. E.) Homologs of Paris Green. I. Lower Members of Acetic Acid Series—*Jl. Econom. Entom.* 1935 Aug Vol. 28 No. 4 pp 710-714

Copper aceto-arsenite or Paris green has been a commercial product for nearly a century. Its principal use prior to 1870 was as a pigment. It came into wide use for poisoning the Colorado potato-beetle and other insects before the introduction of lead arsenite as an insecticide. In 1906 Avery prepared a series in which formic, propionic, butyric, monochloracetic and trichloracetic acids were substituted for acetic acid. His conclusions were that Paris green and its homologues were compounds of copper meta-arsenite and the copper salt of the acid used, in which the ratio most frequently approached 3 to 1. The analyses made by the author show that Paris green and its homologues are definite compounds of copper meta-arsenite and the copper salt of the corresponding acid, and that the ratio of the two constituents is very close to 3 : 1 in all cases

W F

WINCKEL (Ch. W. F.) Die Praxis der therapeutischen Malaria [Malarial Therapy]—Reprinted from *Psychiatrische en Neurologische Bladen* 1935 No. 3 20 pp With 14 charts. [13 refs.]

An account of malaria therapy as practised in Amsterdam. The author is the malaria consultant to the Psychiatric Clinic at Amsterdam. He gives a clear account of the methods employed there for malaria therapy. These do not differ much from those now generally employed. One or two points may be referred to. In order to damp down the symptoms of the infection when they tend to get out of hand, but not to kill off all the parasites an injection of a small dose (150 mgm.) of neosalvarsan is recommended. They have now abandoned the use of provocatives or stimulants of the malarial infection adrenalin etc. as being unnecessary when systematic blood examinations are being carried out. The importance of regular blood examinations is rightly stressed. As the number of cases of general paralysis of the insane is limited in Amsterdam itself he considers that it would improve the organization and facilities for investigation if cases in the north and south province of Holland and Utrecht were included in the scheme. Amsterdam acts as a centre for distributing malarial blood to various clinics in Holland.

E D W Greig

REVIEWS AND NOTICES.

MCKINLEY (Earl Baldwin) M.D. etc. A Geography of Disease. A Preliminary Survey of the Incidence and Distribution of Tropical and Certain Other Diseases. Supplement to Amer Jl. Trop. Med. 1935 Sept Vol. 15. No 3 pp. xxv + 493

This Survey was made possible by a grant from the American Leprosy Foundation to the Division of Medical Sciences of the National Research Council, U.S.A., and is dedicated to the memory of Theobald Smith who was one of an advisory Committee of three. The author is Director of Studies to the Division. One of his objects is stated to be to give impetus and encouragement to the development of the field of tropical medicine by both lay and professional interests. Statistical data from tropical and subtropical countries in all parts of the world are presented in tabular form, supplemented by sketches of the social-economic background of each area for which acknowledgment is made to the "Statesmen's Yearbook". These tables and letterpress make up the bulk of the survey. They are followed by short essays on 18 selected diseases, regarded as well problems by American authorities with statistical summaries and references and by an Appendix of documents on various subjects from different parts of the world which were consulted for inclusion in the body of the survey.

A survey such as this might be based on a study of the reports issued by Governments and Institutions or by a questionnaire circulated to medical departments or individuals in the areas from which information was desired. From many areas, however, reports are not available and when such are issued the differences in their form and method of presentation make comparison difficult if not impossible, and it is the questionnaire which has been here adopted. This is in two parts: 1. Tropical Diseases. 2. Diseases usually considered as of Temperate Climates. In the first list there are 80 entries, and many of these have sub-heads. The second list contains 32 entries.

Following the column of disease headings are five blank columns for the presence or absence of the disease, its distribution, number of cases, vector or intermediate host and whether considered important to public health or not.

No two authorities or even authoritative committees would be likely to agree on the best form of such a questionnaire and, taking it as it stands, the reviewer ventures to suggest in the light of the returns, that some definitions or expansion of headings would have cleared up ambiguities.

Some of the disease headings have been variously interpreted. Thus "tropical liver" is by some considered to be amoebiasis of that organ by others as something else. "Septic sore" may mean ulcers apart from *ulcus tropicum*, which has its own heading, but that it does not usually convey this meaning is shown by the fact that in some tropical African returns "septic sore" does not figure at all, and chronic ulcers get their only mention in a footnote to *ulcus tropicum*.

"Tinea imbricata" should not have presented difficulty. It is a well recognized disease chiefly found in islands of the Pacific but in several African returns a large number of cases are recorded with the footnote that *Tinea* is meant [the printer has usually rendered it *Taenia*] one must conclude that most of the ringworms appear under

this head. Climatic bubo too is a well-defined condition more appropriately named, now that its nature is known. Paradenitis or Lymphogranuloma inguinale many cases are returned as such with a note that non-specific bubo is meant. It is indeed necessary to study the footnotes in every return.

Would not a transposition of words have improved the heading of the second column Present or absent now or previously? The wording perhaps accounts for the + sign in the yellow fever returns from Uganda, Tanganyika, Zanzibar and Straits Settlements. As the question is worded the reply must under any conditions be Yes.

It is satisfactory to note that the British Empire portion of the survey occupies 193 pages against 44 for French possessions and less for other countries there are no returns from Algeria or Tunis. Dr McKinley justly acknowledges the help afforded him by SCOTT's Supplements to the *Tropical Diseases Bulletin*.

The survey is a mine of information to the professional man who will not be misled by returns in which presumably sporadic cases are recorded, e.g. St. Lucia in which kala azar, trypanosomiasis and guinea worm have the + sign and Gibraltar in which returns most tropical diseases have a + the number of cases for the year in question (1932) being in 27 instances recorded as 0.

If it is intended to pursue this enquiry and publish a further volume the recorders might be asked to state in what proportion of diseases caused by animal parasites the diagnosis was made by microscope in some instances this is stated. In a revised questionnaire room might be found for Fevers of Unknown Origin and Infective Eye Diseases other than Trachoma.

Dr McKinley and his collaborators have done a useful piece of work. The inquirer will find here under one cover tables of the diseases recorded in nearly all tropical and subtropical areas of the globe with some indication of their prevalence and their significance as public health problems. Dr McKinley will have the thanks of all students of tropical disease.

A G Bagshawe

PATERSON (A. R.) [Director of Medical Services Kenya Colony] with the Assistance of Many Officers of the Agricultural, Education Forestry and Medical Departments of Kenya. *The Book of Civilization. Part II. The Story of the Forest and the Land and the Men and the Cattle.*—pp viii+52. With 3 plates (2 coloured) 1935 London New York Toronto Longmans Green & Co [1s.]

As the reviewer of Part I stated (this *Bulletin* 1935 Vol. 32, p. 306) this book has been written for Africans with a view to affording them help in realizing the problems at issue in proper housing, hygiene, farming, stock raising etc. Part II deals with The story of the forest and the land and the men and the cattle. What do we want—the means to Happiness—Food supplies—Cultivation of Crops and cattle—The use of money as a means of exchange—The power to buy—A reason for producing.

Much that is said in regard to the wasteful methods adopted by natives in agriculture etc. and the necessity for the adoption of newer ways is all to the point. The loss to a country by the indiscriminate destruction of forest and similar problems are well demonstrated.

But many, whether they be medical men, educationists or anthropologists will disagree with the writer of the book over some of the main issues and over many details as was pointed out by the reviewer of Part I.

It is suggested, for instance, that wheaten bread, tea, coffee and sugar should be staple articles in the diet of the native and that water filters should be used—a very dangerous doctrine. It is suggested that the great aim for the native should be the gain of sufficient money to pay for the schooling of his children—a very debatable point.

It is suggested that trade with Japan should be encouraged—one fails to see the reason.

The story is told in a phraseology which is doubtless an attempt to copy the method of story telling among natives, reminiscent in some ways of the Old Testament. Such a method doubtless appeals to the author but since it is written in English it is a question whether it would not have been better to introduce the native to straightforward English prose and thereby have saved many pages of text.

It is not obvious either why some half dozen footnotes are given to explain some simple words—"bare—uncovered," "trampled—walked heavily upon"—when at the same time the text is full of English idioms.

H. S. Stewart.

BUREAU OF HYGIENE AND TROPICAL DISEASES

TROPICAL DISEASES BULLETIN.

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[No 4

MALARIA.

MARTON (E.) Malaria im Menschen Malariaarten und Stämme. [Human Malarial Infections]—Reprinted from *Zent f d gesamte Hyg* Vol 31 No 7/8 pp 369-386 [4 pages of refs.]

A critical review of literature dealing with malaria which has appeared during the last ten years.

The author states that many more than 3 000 communications dealing with malaria have appeared during this period. In his review he is able to deal only with a selection of them.

It is interesting to note the important part played by malaria therapy in helping to solve many important problems in connexion with this disease. The important work of JAMES in this country is dealt with. The author discusses the question of there being a difference between the strain of malarial parasite used for malaria therapy and the parasite of the natural infections. He refers to various apparent differences in the clinical features etc. of the two conditions. He concludes that there is no difference in the strains, and the various anomalies are due to peculiarities of the cases themselves and not of the inoculation strains.

Those interested in this subject should read the paper in original.

E D W Greig

ROSA (Alberto) L'influenza dei fattori meteorici sull'andamento della malaria. [The Influence of Meteorological Factors on the Spread of Malaria]—*Riv d Malariaologia Sez. I.* 1935 Vol. 14 No 5 pp 424-437 With 2 figs. [10 refs] French summary

The author's observations were carried out in the Ferrara Commune. He studied the rainfall, and temperature changes from 1900-1932 the malaria returns for the period 1922-34 and the rainfall temperature and relative humidity from 1924 to 1934. He concludes that in undrained or improperly drained areas the rainfall is important in so far as it creates or maintains breeding sites that is the numbers of anopholes are the chief factor and the temperature and relative humidity are secondary where drainage (bonifica idraulica) is good the temperature and relative humidity are the determining factors as favouring the duration of life of the mosquito [the article savours rather of 'Science from an easy chair']

H H S

Birbhum. During the dry season effort is concentrated on abolition of mosquito breeding places and all the work is done by the villagers themselves acting on co-operative principles. They form themselves into Health Societies under the guidance of the Institute. After the onset of the rains, temporary collections of water are dealt with by oiling persons suffering from malaria are treated with quinine or preferably with cinchona (?) cinchona febrifuge) and the healthy are given 5 grains twice a week as a prophylactic.

W F

ARXAUD (J.). La prophylaxie du paludisme à In Salah (Tchad).
Essai d'introduction des gambousies dans une oasis saharienne
'Malaria Prevention in the Oases of In Salah.]-Arch. Inst. Pasteur
d'Afrique 1935 Sept. Vol. 13. No. 3. pp 369-378. With
1 plan & 4 figs. on 2 plates.

This oasis measures about 4 miles long by 600 yards broad in population, together with that of a neighbouring smaller oasis, numbers 20 Europeans and 1,000 natives. The splenic index is only 3.1, but malaria as occurs is mild in type—the only anopheline found is *A. multicolor*. Rain is rare and when it comes it sinks quickly into the sand. The palm plantations are irrigated with water from artesian wells and underground channels. All surplus water dries up during the hot weather which lasts from May to October but during the rest of the year pools of stagnant water in the plantation are very numerous. The author obtained a supply of Gambusia from the oasis of El Gola, 420 kilometres to the north, and acclimatized them gradually to the saline waters of In Salah where they are proving a success.

W F

FLETCHER (Alfred H.) A Permanent Type of Ditch Construction—
Am. J. Public Health 1935 Aug Vol. 25. No. 8. PP
897-906. With 6 figs. & 1 chart.

Approximately \$140,000 (£28,000) have been spent on malaria control in Memphis, Tennessee, during the last 14 years. The chief charge has been the oiling of the ditches. Recently 8 miles of permanent drains, lined with concrete and sods or with "rip-rap" material and sods, have been constructed with the help of relief labour. Rip-rap is broken pieces of concrete or stone with one smooth surface, such as may be obtained from old walls, paving etc. This report gives technical details of the way in which the drains are being made and it is illustrated with excellent "before and after" photographs.

W F

BIZARD (M.) Paludisme autochtone dans le régime naziémie.
Indigenous Malaria in the St. Nazaire District (Loire Inférieure).—
Ann. d'Hyg. Pub. Indust. et Sociale 1935 Sept. Vol. 13.
No. 9 pp. 505-512.

Malaria was common here 45 years ago—it has now disappeared though *A. maculipennis* is plentiful.

Malaria was common in this district 45 years ago, and some of the chemists sold as much as 6 or 7 kilograms of quinine in a year. After 1895 it became less and less common until it disappeared altogether for the last 12 years there has been no malaria in la Bretagne. The

district consists of an immense plain some 8 000 hectares in extent which is a vast lake in the winter and a grassy prairie in the summer. The villages stand like islands in this plain each surrounded by a dyke and a circle of trees. Inside the dyke is a circle of houses and in the middle are arable fields. During the winter they are surrounded by floods and communication with other villages is made by boat. The houses are thatched, single roomed hovels with earthen floors. Until the end of last century the inhabitants supported themselves by turf cutting in the summer and by fishing and catching wild duck in the winter. They were miserably poor. During the last 50 years and especially since the war communications have been improved and the inhabitants have been able to work in shipyards factories and towns and their standard of living has been improved. This has raised their resistance to disease. Their houses have been improved and are less attractive resting places for mosquitoes. They now keep cattle instead of sheep and these are brought in at night and kept in sheds adjoining the houses. These changes acting together are probably responsible for the disappearance of malaria, for *A. maculipennis* is still present in large numbers.

Cases of malaria still occur occasionally in the towns situated on the borders of la Brière (Trignac Penhoet and St Nazaire). Fifty cases have been diagnosed in these localities during the last 13 years. Most of them have been benign tertian infections and they have occurred in the neighbourhood of old repatriated cases of malaria. It is possible that some cases particularly in St Nazaire have been infected from cases brought on ships coming into the port.

W F

POGGI (Igmo) Lo stato attuale dell'endemia malarica nel comune di Vigevano [The Present Incidence of Malaria in Vigevano (Pavia)] —Arch Ital Sci Med Colon 1935 Sept. 1 Vol. 16 No 9 pp 683-694 With 1 fig [21 refs.] English summary (5 lines)

In the Commune of Vigevano there is not much malaria. 33 cases were reported in 1934 and in the past 15 years there has been a total of 391 only. A plan of the district is given and 29 of the total 33 occurred in one area, Morsella, while of the 391 in the 15 years 266 or 68 per cent were in this section and next came Sforzesca with 65 or 16.6 per cent, but in the last 8 years there has been no case in the Sforzesca section. In short, Morsella is now the only endemic focus. The prevailing mosquito is *A. maculipennis messeae* and in small numbers the melanon variety. These occur over the whole territory so there is elsewhere considerable anophelism without malaria, and it is probable that adequate treatment of the infected would eradicate malaria from Morsella also as this measure has proved so effectual in other parts of the commune.

H H S

FADDA (Siro) La malaria nelle Colonie Italiane dell'Africa orientale. [Malaria in the Italian Colonies in East Africa.]—Rassegna Econ omica d Colonne 1935 Nov-Dec. 23rd Year No 11-12 pp 713-720. With 2 maps.

Maps are reproduced demonstrating by varied shading the zones of prevalence of malaria in Eritrea and Italian Somaliland and in the letterpress a few words are given regarding the local incidence. *Anopheles costalis* is the common vector but *A. quadrimaculatus*, *A. funestus* (rare), *A. mauritanicus* and *A. pharoensis* also are found, but

there is no evidence that either of the two last act as local vectors of malaria. All three forms of malaria are met with but *P. falciparum* vastly preponderates of 1,825 blood smears examined 5 per cent were benign tertian, 0.5 per cent. quartan, all the rest were subtertian. Pernicious forms are rare.

H H S

MONTAÑES (P) & CARDENERA (M) Una epidemia de paludismo a partir del virus palúdico. [An Outbreak of Malaria spread from Inoculated Patients.]—Rev San e Hig Pública. 1935. Sept Vol. 10. No. 9 pp. 213-218. With 1 fig.

In the summer of 1934 cases of malaria began to appear in Huesca, a place some distance from the sketch included in this article there is no scale of distance from the asylum in which malaria inoculations were being made for treatment of general paralysis. The first person attacked was a woman who had come to the asylum direct from And in the Pyrenees, where malaria is unknown. She suffered from attack of fever and *P. vivax* was found in her blood, although she was not one of the inoculated patients. This was in September 1933. During 1934 up to 14th July 45 cases had occurred and later there were others. 52 are represented on the sketch—15 in the town of Huesca, 23 in the asylum, 4 in Tierz 2 in Quicena and 3 in isolated houses. There were two ponds near the asylum and another near Quicena in which Anopheles larvae were found.

H H S

BARNER (M A.) & RICE (J B) Malaria Studies in Greece. The Malaria Infection Rate in Nature and in the Laboratory of Certain Species of Anophèles of East Macedonia—Ann. Trop. Med. & Parasit. 1935 Oct 5 Vol. 29 No. 3 pp. 329-343.

A. clathratus is the most important vector in northern Greece. *A. superpictus* probably plays a secondary part, though it is more readily infected in the laboratory. Deviation by domestic animals.

Mosquitoes were collected in the country which lies between the lower part of the Nestos River and the valley of the Struma this is probably representative of all northern Greece as far as the natural infection rate of Anopheles is concerned. The average rates of infection over 10 months were *clathratus* 2.37 *superpictus* 1.82 *maculipennis* 0.27. No variety of *maculipennis* was found except *maculipennis* and *strobli*. Both *clathratus* and *superpictus* reach their maximum of infection in midsummer. The first sporozoite-positive specimens were found on the following dates *clathratus* May 21st, 1934 *maculipennis*, June 2nd, 1933 *superpictus* June 29th, 1933. Precipitin tests made on mosquitoes caught in houses and in stables showed that either had a far higher percentage positive for human blood than any other species. The figures were *clathratus*, in houses 61.3 in stables 7.5 *maculipennis*, in houses 21.2, in stables 0.5 *superpictus* in houses 29.7 in stables 1.6. The feeding habits of infected *clathratus* were found to be the same as those of non-infected specimens, for the proportion of them which contained human blood was the same as the general rate for this species. Catches made during the day showed that *clathratus* had the highest degree of preference for houses and *superpictus* for stables. " *Elaphrus* is the only species in which house-frequenting, sporozoite index, and percentage human-positive of blood meals run at all parallel."

The percentages of these anophèles which became infected when they were fed in the laboratory were very different from those found in

nature. They were as follows *clutus* 20.3 *maculipennis* 20.2 *superpictus* 55.2. *A. algeriensis* was also readily infected in the laboratory but it is not a natural carrier in Macedonia. *Maculipennis* is probably of little or no importance in the actual transmission of malaria there are large numbers of domestic animals in the villages, and deviation to animals is the probable explanation of the low sporozoite rate found in wild mosquitoes of this readily infected species.

The rôle played by *superpictus* in this part of Macedonia is difficult to determine. During recent years the numbers of *clutus* in some villages have been greatly reduced by drought while *superpictus* which breeds in spring fed streams has not been affected. The authors found that the parasite rate in the children of these villages had fallen though *A. superpictus* was flourishing and they also found that the sporozoite rate of *superpictus* itself was reduced as well. They consider that this species becomes of importance when a high percentage of the inhabitants has already been infected by the agency of *clutus*.

It is quite possible that a species which, like *superpictus* has a relatively low human precipitin rate may show many infections by virtue of the large number of gametocyte carriers provided by a more effective associated species and without this powerful ally it might show but a small oocyst or sporozoite rate. During a very long warm season here or in a warmer region *superpictus* might become more dangerous and in a region less abundantly supplied with domestic animals both *maculipennis* and *superpictus* might be important vectors. We believe however that our work has established a presumption sufficiently strong to warrant the attack on *clutus* only in this region.

W F

SADOJAN (W S) & ISTAMANJAN (L. S) Atypische Malaria Formen im Gebiet von Datalu im Jahre 1931 [Atypical Malaria in Datalu, Armenia].—*Arb d Tropeninstituts d Volksgrndt Kommissariat d SSR Armenien* 1935 Vol 2. [In Russian p 342. German summary p 370]

The authors relate that in the latter part of 1931 September to November certain cases of malaria occurred which presented anomalous symptoms by reason of which the diagnosis was for a time in doubt. Thirty two such cases came under their observation. 12 of them presented neuro-psychic symptoms resembling those of tetany meningitis and other nervous affections. 10 showed symptoms of renal involvement 6 had signs of hepatic disease and 4 entero-colitis and dysenteric symptoms. In all malaria parasites were found in blood smears and the symptoms cleared up after treatment with quinine. Some were associated with the benign tertian parasite. The authors are of opinion that these atypical symptoms were due in part at least to an increased virulence of the plasmodium when infecting persons coming from a malaria free district to work in Datalu.

H H S

DE MELLO (I. Froilano) & BRAS DE SA (L. J.) Ne pourra t-on faire revivre la Vieille Gôa ? (Une page intéressante de malariologie le paludisme des ruines et des villes mortes.) [Malaria of Ruined Towns. Can "Ancient Goa be Restored ?"]—*Riv d: Malariaologia* Sez. I 1935 Vol. 14 No 3 pp 273-291 With 2 plates.

Nothing remains of Old Goa but a mass of ruins overgrown with luxuriant vegetation. Its total population numbers only 75 persons.

and only half of these are in permanent residence. It is full of abandoned wells and pools—the authors counted 296 many of which were hidden by undergrowth and ruins. It is notorious for a malignant type of malaria. The importance of Old Goa is largely sentimental, the body of St. Francis Xavier is buried there—it is therefore venerated by Catholics all over the world and is a place of pilgrimage not only for Christians, but for people of all castes and creeds. The wells and pits are the principal breeding places of *A. falciparum* and *A. vivax* the carriers. This survey was made at the cost of the canons of the cathedral who subscribed privately for the purpose. The author pleads that an attempt should be made to rescue the old town—the Rome of the east which once had a population of 300,000 and which is the only place of Christian pilgrimage in the East.

W F

RAM (Raja) Roads and Malaria in India.—Reprinted from *India Engineering* 1935 Apr 6 pp. With 7 figs. & 1 plan.

A useful article illustrated with photographs and plans drawing attention to malaria caused by engineering work, and suggesting remedies.

W F

COWELL (G) & BAILY (J D) Malaria in Sind. Part XIII. Malaria in Hala Taluka, Hyderabad District, and in Kandiaro, Sinjhoro and Sabdadpur Talukas, Nawabshah District. Part XIV. The Seasonal Incidence of Infection with the Different Species of Malaria Parasite in Larvacea.—*Records of the Malaria Survey of India*. 1933. June Vol. 5 No. 2. pp 109-119 121-129 With 1 chart.

WILSON (T) Meteorological Factors as affecting the Incidence of Malaria.—*Malaya Med J* 1935 June. Vol. 10 No. 2 pp 39-48. With 5 charts & 1 map [15 refs.]

The number of *A. maculatus* caught in houses does not necessarily correspond with the total number. A larger proportion enters houses when the wet-bulb temperature is high.

The author reviews the incidence of malaria over a period of five years in the Tampin and Kuala Pilah districts of Negri Sembilan which is one of the Federated Malay States. There are two rainy seasons, a lesser one in March, April, May and a greater in October, November and December. The larval incidence of *A. maculatus* the principal carrier is at its height shortly after the greater wet season—the adult incidence is highest during the lesser wet season in March, April, May. Malaria incidence is highest in May, June, July. The author points out that the adult incidence is obtained by catching mosquitoes in houses at night and that it represents the number seeking human blood, and not necessarily the adult output of the breeding places. *A. maculatus* appears to be more active in seeking blood during the period of higher wet bulb temperature.

W F

JACKSON (R. B.) Annual Report of the Work of the Malaria Bureau for the Year 1934.—*Hong Kong Med & Soc. Rep for Year 1934*. Appendix B pp. 116-158. With 1 folding plate.

This record of the very large amount of work which has been done during the year deals with the results of investigations made in different

villages and camps and is chiefly of local interest. Malaria in Hong Kong is rural malaria. The following mosquitoes were found infected *A. minimus*, *A. jeypariensis*, *A. hyrcanus*, *A. maculatus* and *A. splendens*. The first two are the most important carriers. The most dangerous breeding grounds are abandoned rice fields in hilly country and in the last quarter of the year cultivated fields during the draining off of the water just before the second harvest. A number of precipitin tests were made by M. Toumanoff of the Pasteur Institute Saigon on the stomachs of Anopheles caught at a labourers camp at Shing Mun in Hong Kong where a dam is being built and a large proportion of them were found to contain human blood. The percentage of admissions for malaria as compared with the admissions for all diseases to the hospitals was only 3.27 per cent. (1392 of 42058) (See this *Bulletin* 1935 Vol. 32 p. 731)

W F

GERLACH (J. H. A.) Nadere beschouwingen over de malaria in de Onderafdeeling Dairiland (Residentie Tapanoeli) [Further Consideration of Malaria in the Subdistrict Dairilands (Tapanoeli Residency)]—*Geneesk. Tijdschr. v. Nederl. Indie* 1935 Sept 17 Vol. 75 No. 19 pp 1639-1645

SCHÜFFNER has given as the causes of a low spleen rate in conjunction with a high parasite index the following—(1) A commencing acute epidemic. (2) Such a severe endemic of pernicious malaria that the spleen does not react on account of the prevalent cachexia. (3) Quinization especially in *malaria tropica*. (4) The non inclusion of the lowest degrees of splenic enlargement which is all important where endemicity is slight. (5) A definite form of inherited immunity (premunition) such as is found for example among the Bantus in Africa.

In the Netherlands Indies a high spleen rate in all age groups is regarded as typical of severe endemic malaria together with a much lower parasite index particularly in adults. HELFFERICH published [this *Bulletin* 1935 Vol. 32 p. 96] as a notable exception to the findings of SCHÜFFNER and SWELLENGREBEL, his observations in the Dairilands district where practically throughout there was found a low spleen rate with a high often much higher parasitic index. Gerlach has continued these investigations in the same district and has obtained the same result for numbers which are considerable and which although separately given for 3 kampongs, may be combined as follows—(1) 416 children under 6 years spleen rate 1.2 per cent. parasite rate 7.7 per cent. (2) 1,370 children over 6 years spleen rate 4.5 parasite rate 5.8. (3) 527 adults spleen rate 0.9 parasite rate 4.6 per cent. He summarizes his findings taken in conjunction with those of his predecessor thus—As is commonly the case in the Netherlands Indies the chronically endemic malaria of the Dairilands which gives rise to a high spleen rate at all ages and to a relatively low parasitic rate diminishing gradually with advancing age is only found when frequent infection persists. On the contrary when the infection rate is small a low spleen rate occurs which is at its highest in older children and then gradually diminishes while the parasite index is relatively high and often much higher. The latter however just as in the case of severe endemic malaria, probably diminishes with increasing age.

The author's view is that the essential cause for this state of affairs is a differentiation in the biological type of the malaria parasite and not a development of a degree of body resistance. W F Harvey

GARNHAM (P. C. C.) Hyperendemic Malaria in a Native Reserve of Kenya and the Influence upon its Course of Atabrine and Plasmoquine.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1935. July 31. Vol. 29 No. 2 pp. 167-183. With 4 charts. [10 refs.]

Malaria in the African native living in a hyperendemic village area causes little sickness even in children, and preventive drug treatment serves no useful purpose in such a population.

This investigation was carried out in Taveta, which lies near the Tanganyika border of Kenya Colony where the first shot in East Africa was fired during the War. The natives live in a strip of forest where malaria is hyperendemic. There were about 25 adults and 20 children in each village. One gram of atabrine (less for children) was given monthly in 10 separate doses, to each inhabitant of one village. In a second village 0.1 gram of plasmoquine was given in 10 doses. A third village was observed as a control. The treatment was continued for a year. The only apparent effect was a lowering of the average number of parasites found in blood films of the inhabitants of the treated villages—the parasite and spleen rates were unchanged. This did not appear to be a result of much value, because malaria causes very little sickness among the natives in spite of the heavy blood infections. The average number of clinical attacks of fever during the year was one for each inhabitant. The author considers that malaria in the native of tropical Africa resembles the malaria of birds, reptiles and monkeys—immunity has become so complete that morbidity is reduced to a minimum. Eighty-five per cent. of the infants were infected by the 5th month and 100 per cent. by the 6th, but in spite of this, they looked well-nourished and healthy. Subtertian and quartan infections are ubiquitous, but benign tertian is rare and has a local distribution, occurring only in certain places. It is very remarkable that, in Taveta *P. vivax* seems to be the most dangerous parasite. *P. exca* and *P. falciparum* appear at the end of the second month of life. *P. malarias* does not appear until the fifth month, but by the end of the first year nearly every child is infected with this parasite. Immunity against *P. malarias* is soon established, and only 1.3 per cent. of quartan infections were found in 1,000 adults. Approximately half the infants over two months had crescents in their blood. About 80 per cent. of the children showed parasitic infection. 30 per cent. of the young adults and 25 per cent. of the older ones.

JF

HOLT (R. V.) & WORDEN (R. D.) Malaria Epidemic in Aurora, Ohio.—*Public Health Rep.* 1935. July 5. Vol. 50 No. 27 pp. 885-887

Interesting because of the quarantine imposed on the patients.

Aurora is a village about 30 miles from Cleveland, with a population of 1,000 and "two attractive fountains patronized by tourists." It had had no malaria since records were first kept in 1920 until the late summer of 1934 when there was an epidemic of benign tertian with 37 cases. The breeding places were oiled and, "on advice of the State Department of Health, patients were required to stay within screened enclosures until 4 negative blood smears, taken at least 24 hours apart, were obtained. This regulation was supplemented by an agreement signed by the patient or parent to complete 8 weeks of quinine or 5 days of atabrine therapy and to submit to a final blood examination after treatment had been completed."

JF

COLLIGNON (E.) Observations générales sur la campagne anti paludique de 1934 dans le département d'Alger [The Antimalaria Campaign of 1934 in the Department of Algiers]—Arch Inst Pasteur d'Algérie. 1935 Sept. Vol. 13 No 3 pp 377-396 With 10 figs. on 5 plates.

The year 1934 was marked by an increase of malaria which was attributed (1) to a lack of immunity in the population resulting from a succession of healthy years (2) to the migration of numbers of people into newly developed areas (3) to an unusual distribution of the rainfall and (4) to poverty due to trade depression. This increase of malaria has not affected the whole of the country, in those places where antimalaria work has been carried out there has been no increase except in a town near a lake which is now being drained through a tunnel into the sea. The carrier is *A. maculipennis* var *labranchiae* which is found in the houses as well as in the stables. The measures adopted for the control of malaria are (1) Permanent engineering works such as the tunnel already mentioned (2) Temporary work such as fortnightly oiling and minor filling and drainage (2) The introduction of Gambusia (4) Quininization which is carried out in all centres from the beginning of May until the end of November and especially concerns children. The natives take quinine with enthusiasm and the chocolates containing aristoquine are liked by the children. W F

AMBIALET (R.) La campagne antipaludique de 1934 dans le département de Constantine. [Malaria in the Department of Constantine during 1934]—Arch Inst Pasteur d'Algérie 1935 Sept Vol. 13 No 3 pp 397-409 With 10 figs. on 5 plates & 3 plans.

The incidence of malaria was definitely above the average though it was not as severe as it has been in some of the very bad years of the past. The year was exceptionally wet, and many marshes that are normally dry in the summer provided breeding places for mosquitoes. Some places in the plains which are free from malaria in dry years experienced severe epidemics but the mountain villages where streams are the only breeding places were not troubled by outbreaks. Anopheles are most active from the middle of June to the middle of July and again in September and November. There is little or no transmission in mid summer because the intense heat and the sirocco destroy the mosquitoes. Details of malaria and of the measures taken to deal with it in different centres are given together with some excellent photographs showing reed fringed lakes marshes and water-courses with strings of shallow pools. Good results have been obtained by anti larval measures combined with quinine prophylaxis and treatment special attention being given to the children. B F

GOUDET (R.) La campagne antipaludique de 1934 dans le département d'Oran.—Arch Inst Pasteur d'Algérie 1935 Sept. Vol. 13 No 3. pp 410-417 With 12 figs. on 6 plates.

LA CAVA (G.) *Plasmodium immaclatum* (Graassi e Feletti, 1892) Schaudinn (1902) è l'esatta denominazione per il parassita agente della malaria terzana maligna. [The Correct Name of the Parasite of Malignant Tertian Malaria.]—Polichinico Sez. Prat. 1935 Nov 4 Vol. 42. No 44 p 2187

According to the author of this note the usual denomination, *P. falciparum* for the parasite of malignant tertian malaria is a synonym

the correct name being *P. immunguisum* Grassi and Feletti 1892 and Schaudinn 1902. Other synonyms, he states, are *Harmatoxys immunguisum*, *H. praecox* Latreille 1816 and *Harmatoxys sphaerium*. [This question has been discussed more than once before (see Protozoology by C. M. WEXFORD Vol. 2, p. 234). "If it be considered that Grassi and Feletti's name *P. immunguisum* was employed for a parasite which cannot definitely be identified with that of malignant tertian malaria the "correct name for the parasite will be *P. sphaerium* (WELCH 1897)"]]

H. H. S.

BORRAS (P.) Un cas de paludisme congénital. [A Case of Congenital Malaria.]—*Bull. Soc. Med.-Chirurg. Indochine*, 1935. Feb.-Mar. Vol. 13. No. 2 pp. 137-138.

Parturition occurred on 14th February. Benign tertian gameteocytes were found in the mother's peripheral blood and in the umbilical cord of the child. Neither mother nor child had fever. The mother was treated with quinacrine. On 20th February no parasites were found in either but both of them had a high percentage of merozoites.

H. F.

TANNER (A. Cecil) & HEWLETT (R. F. L.) Congenital Malaria with Report of a Case in One of Twins.—*Lancet* 1933. Aug. 11. pp. 369-370. [15 refs.]

A case of congenital malaria without fever in a child born in England whose mother was infected in India.

The mother returned to England from Bengal in September 1934 and gave birth to twins in St. Pancras Hospital on January 14 1935. She had one or two attacks of malaria every month during pregnancy the last of them being 10 days before her confinement. One of the twins was admitted to Highgate Hospital with a history of 4 days illness, when it was 50 days old. Its blood was examined on March 8, 53 days after birth, and benign tertian parasites were found. The spleen was enlarged to 4 cm. below the costal margin. The child was given no specific treatment during the first 10 days, and, though at the end of this time it still had parasites in its blood, it had neither fever nor rigors during the whole period of observation. It was then given two five-day courses of atebon with six days interval between them. The daily dose was 0.05 gram in divided doses. No parasites were found afterwards. There was some vomiting and slight diarrhoea during each course but no other toxic symptoms or skin staining. No parasites were found in the other twin during repeated examinations. The spleen was not enlarged. Benign tertian parasites were found in the mother's blood.

H. F.

SHIROKOGOROV (J.) Symmetrical Gangrene of the Lower Extremities in Malaria, and its Pathogenesis.—*Med. Parasit. & Parasitic Dis.* Moscow 1935. Vol. 4. No. 3. [In Russian pp. 220-227]

During 1932-1933 the author observed gangrene of the toes in a number of cases of M.T. malaria from the endemic regions of Azerbaijan (Caucasus). The majority of them recovered, but fifteen died and provided material for the histopathological investigation. All the cases showed signs of marked emaciation. In the majority the lesions represented dry gangrene affecting the nail phalanges of the toes.

of one or both feet while in some cases mutilation was present. Sometimes the process assumed the character of moist gangrene extending to the foot and leg. Microscopical examination revealed thrombosis of the venules of the affected parts and changes in the walls of the arteries. The pathogenesis of this form of gangrene is viewed by the author as follows —The toxins bring about sclerotic changes in the walls of the small arteries and veins and cause the swelling and desquamation of the capillary endothelium. Alteration in the physico-chemical properties of the blood due partly to the erythrocytes being loaded with parasites agglutination of the red cells the frequent formation of thrombi in the capillaries are factors causing a retardation in the circulation of the blood and finally exposure to cold—by increasing the viscosity of the blood—leads to stasis in the affected parts, with the consequences already described. C A Hoare

DUMITRU (C. C.) & POPOVICI (A.) Paludisme associé à l'urticaire et un syndrome douloureux abdominal aigu [Malaria associated with Urticaria and Acute Abdominal Symptoms].—*Bull et Mem Soc Méd Hôpital de Bucarest*. 1935 June Vol. 17 No 6 pp 99-101

The authors were called urgently to a patient with acute abdominal symptoms and urticaria. A history of malaria contracted 9 months before and of two subsequent relapses put them on the right track. They examined the patient's blood, instead of sending him to the operating theatre and they found benign tertian parasites. They attribute the abdominal pains to transient thromboses produced by parasite laden corpuscles malaria pigment etc. and to the blocking of the biliary passages with thickened bile. The urticaria they consider as evidence in favour of the theory of ABRAHAM and SENEVET that the paroxysm in malaria is a manifestation of anaphylaxis. W F

MARSEILLE (A.) Een geval van malaria quartana met verschijnselen van appendicitis. [Quartan Malaria simulating Appendicitis].—*Geneesk Tijdschr v Nederl Indië* 1935 Aug 20 Vol 75 No 17 pp 1505-1506

The patient an adult complained of pain about the umbilical region and of constipation there was no vomiting. Forty-eight hours later after the bowels had acted, pain was felt in the right side of the abdomen and particularly so on palpation over McBurney's point. There was no enlargement of liver or spleen pulse 70 good temperature 37.6°C in the evening. Blood smear showed schizonts of *P. malariae* and the large monocellular count was 8 per cent. of a total of 5200 leucocytes Quinine was given and the symptoms cleared up.

The author has found 10 similar cases recorded 5 were diagnosed only after operation had been undertaken. Of these ten 8 were infected with *P. vivax* 2 with *P. falciparum*. Attention is called to the slight leucopenia and relative monocyteosis in these cases.

H H S

CHATTERJEE (Nirmal Chandra) A Case of Capillary Bronchitis and Cerebral Malaria.—*Calcutta Med Jl* 1935 Oct. Vol. 30 No 4 pp 231-233.

YOUNG (A. Greville) Cerebral Malaria or Encephalitis Lethargica? [Correspondence].—*Brit Med Jl* 1935 Sept. 14 p 523

JORGE (A. Lourenço) DA SILVA (José Ferreira) & LEAL (A. Estrela).
 Esplenomegalias congestivas hemorragicas. [Congestive Splenomegaly with Haemorrhage.]—Bol. da Sociedade Geral de Saúde e Assistência Rio de Janeiro 1935. Oct. 15. Vol. I, No. 2 pp. 13-30. With 3 plates. [24 refs.]

The authors describe three cases of splenomegaly, the spleen extending to below the level of the umbilicus. Two had had acute dysentery and syphilis and all gave a history of malaria. In one a diagnosis of Banti's disease was made. Administration of adrenalin brought about considerable reduction but some time later a week in one case there were attacks of haematemesis and the splenic enlargement was still further reduced nearly to normal. The condition is explained as being a splenic thrombophlebitis and the haemorrhage as due to rapture of the gastro-splenic anastomoses. The precise parts played by the malaria, the dysentery and the syphilitic infection are not determined.

H H S.

MORRA (Ezio) & SALUSTRI (Enrico). Grado di resistenza alla dose di differenti ceppi di *Plasmodium vivax*. [Resistance of Different Strains of *P. vivax* to Quinine.]—Riv. di Malariologia. Sez. L 1935. Vol. 14 No. 3 pp. 263-272. With 12 charts. [12 refs.] English summary (7 lines)

The authors tested three strains of *P. vivax* one from Northern, one from Central and one from Southern Italy each on 4 general paralytics. The points particularly investigated were the period of incubation, the type of fever, the capability of infections in Anopheles, and the resistance of the disease set up to quinine.

As regards the incubation in two cases the northern strain had the long periods of 22 and 19 days, the other two with this strain were 9 and 10 days and, speaking generally there was (with the two exceptions) little or no difference the periods being 10-13 days. In each case 12 Anopheles were used to infect. Regarding the second point, no differences were noted, either among the two infected by Anopheles or others infected by blood inoculation—11 with the northern strain, 20 with the central and 10 with the southern. A protocol shows the numbers of mosquitoes (varying from 670 to 110) applied to those infected with the different strains, the numbers examined and the numbers and percentages found infected. No great differences were detected between the strains with the northern the percentages were 71.5 and 83 with the central 70 to 88.7 with the southern 88.5. Lastly, 0.3 gm. of quinine in one dose sufficed to check the attack of fever due to the first two strains and to cause temporary disappearance of parasites from the blood but this dose had no effect on the fever produced by the southern strain.

H H S.

TRENSZ (F.). De l'influence des ions salins sur la flocculation et la surflocculation du sérum des paludéens. [Henry's Reaction. The Influence of Saline upon Flocculation and Surflocculation.]—C. R. Soc. Biol. 1935. Vol. 119 No. 24 pp. 986-988.

CHORINE and others consider that flocculation and surflocculation are identical, but the author believes that he has shown that they differ fundamentally. He now brings forward additional evidence in support of his views. He has carried out the reaction in solutions of neutral

salts of Na K Mg Ca and NH₄. As the strength of some of these solutions was increased both flocculation and surfflocculation diminished it was not merely a question of molecular concentration but differed with the different salts. Moreover the curves of flocculation and surfflocculation did not run parallel with the increase of salt concentration. For example with ammonia they deviated progressively at first and then approached one another. The maximum deviation occurred at a concentration of 3 per 1000. Some salts accentuated flocculation while they diminished surfflocculation. For example with PO₄(NH₄)₂ in concentrations of 10 to 15 per 1000 flocculation was strongly increased while surfflocculation was suppressed. The results of these experiments tended to show the essential difference between the two phenomena. This could also be demonstrated by gradually increasing the quantity of distilled water used in the test while keeping the amounts of the other components fixed. With progressive dilution melanoflocculation decreased while surfflocculation increased. W F

COSTADONI (Antonio) Ricerche sulla reazione di Henry per la malaria. [Henry's Reaction in Malaria.]—Riforma Med 1935 Sept. 28 Vol. 51 No 39 pp 1467-1470 1473-1475 [95 refs.]

The latter part of this article that in which the author gives an account of his own investigations is of great interest. The first part treats of the devising of the reaction of theoretical considerations as to its rationale and of the findings and records of others.

Dr Costadoni examined 184 sera. Fifty four were from patients with malarial history 32 actually suffering from malaria at the time of examination (31 with benign 1 with tertian infections) 22 had suffered in the past. Thirty sera were from subjects apparently in sound health and 100 were from patients suffering from diseases other than malaria.

In all those (32) with malaria the reaction both melano- and ferro-flocculation was positive. Of the others (22) eight had had attacks recently and the spleens were still enlarged although no parasites were seen in their blood. 7 of these were positive the other doubtful. Another 14 had suffered from malaria some time before as far back as the War. Of these two were definitely positive one doubtful, and one reacted to one form only the melano-flocculation the rest were negative. These the author interprets as confirmation of cure. Two others had been under malaria treatment for syphilis. They were tested prior to inoculation twice during the period of incubation and during the early attacks but invariably with negative results they became positive after 4 and 6 febrile attacks respectively.

Among the 100 suffering from non malarious conditions there were cases of syphilis in different stages of malignant tumours (mostly carcinoma) of hepatic cirrhosis (multilobular) pernicious anaemia, leukaemia etc. Unfortunately there was no opportunity of testing cases of trypanosomiasis leishmaniasis typhus or undulant fever (in which non-specific positive reactions have been recorded). Five among the hundred reacted positively two with secondary syphilitic papular eruption two others with chronic haemolytic jaundice and one with Well's disease. In another patient, with Laennec's cirrhosis of liver, the melano-reaction was positive but not the ferro-reaction.

BRANDT (Robert) & HORN (Ludwig) Erfahrungen mit der Malaria-reaktion von Henry bei Impfmalaria. [Henry's Reaction in Inoculation Malaria.]—*Klin. Woch.* 1935 Oct. 26. Vol. 14 No. 43. pp. 1538-1540

The authors consider that Henry's reaction gives very useful indications in inoculated malaria.

The work was done at Vienna at the instance of WAGNER-JATZKA, the introducer of the malaria treatment of general paralysis, and was interrupted by the death of the second author. The authors used albuminate of iron and found that the dilutions advised by Henry were too great a difference possibly due to the fact that inoculated and not natural malaria was in question. Details of their technique are furnished. The experiments concerned 50 malaria-treated patients and included 128 tests—the controls numbered 206. The results showed that all cases were positive during the malaria cure. The first change was noted at the 3rd-4th attack and the height was reached with the 5th-7th, all were strongly positive at the close. All again became negative with recovery from the malaria [whether natural or drug-caused is not quite clear] the time taken for the change was 14 days to 8 weeks. Two cases were positive before the malaria inoculation. Of the controls half were Wassermann + and half Wassermann —. Among the latter the percentage of non-specific positives lay between 3 and 6. With the Wassermann positives on the other hand the Henry positives exceeded 11 per cent. The authors discuss their experiments from the standpoints of diagnosis and biology with special reference to the cure of general paralysis.

A. G. Bagshaw

CASSUTO (Nathan) Sulla patogenesi delle recidive a lunghi intervalli nella malaria. Ricerche sperimentali sulla scimmia. [The Pathogenesis of Malarial Relapses at Long Intervals.]—*Riv. di Malariologia* Ser. I 1935. Vol. 14 No. 5 pp. 384-390 With 2 figs. on 1 plate. [12 refs.] English summary (9 lines)

Relapses may be regarded as of two types, one of which is of the nature of a recrudescence where a certain number of the malaria parasites survive treatment and continue to proliferate until they are sufficiently numerous to give rise to symptoms. The other type is demonstrated by the author's observations here detailed. He received a *M. rhesus* which had been inoculated in England with *P. knowlesi* in August 1934. Repeated search for parasites in the blood was negative, so a fresh inoculation of 2 cc. blood rich in parasites was made on January 7th, but still none were seen, and a third inoculation of 4 cc. on 19th January was equally barren of proof. The animal was splenectomized in March and survived the operation well but 10 days later the peripheral blood showed an enormous invasion with plasmodia and the monkey died. This is interpreted by saying that the animal was in a condition of "immunity equilibrium," and when extirpation of the spleen removed this defence the animal succumbed to a heavy infection. The spleen had showed malarial pigment but less than that of another *Macacus* similarly infected and dead of it. A third monkey like the first, did not show parasites in its peripheral blood although it had been inoculated 2 months before and examinations were made repeatedly nevertheless its blood when inoculated into two other healthy monkeys gave rise to infection. It is held that in the cases of

the first and third the parasites are few and do not increase owing to the immunological equilibrium until this is upset by operation or in nature by some intercurrent illness or depressant. H H S

VOLJENSKI (L.) Laboratory Experiments on the Application of Schist Products for the Destruction of Mosquito Larvae—*Med Parasit & Parasitic Dis* Moscow 1935 Vol. 4 No 4 [In Russian pp. 316-320]

The author describes the result of the application of various products of decomposition of schists especially of the fraction of tar obtained after the separation of benzene with a boiling point between 250° and 350°C. as larvicides. The extract was mixed with an equal amount of petroleum and applied to the surface of aquaria containing culicine larvae and pupae the dosage being 30 cc. per cub m. The destruction of the developmental stages of the mosquitoes proved to be considerably more rapid than in the control experiments using petroleum alone. Moreover the pungent odour of the schist products protected the aquaria from being repopulated by mosquitoes for at least one month after treatment.

C A Hoare

MOCHKOVSKI (Ch.) La chimioprophylaxie du paludisme. [Prophylactic Chemotherapy of Malaria.]—*Med Parasit & Parasitic Dis* Moscow 1935 Vol. 4 No 3 [In Russian pp. 161-188. French summary pp. 186-187]

This is mainly a review of our present knowledge regarding the use of chemotherapeutic agencies in the prophylaxis of malaria.

C A Hoare

PINTO (Gersonico de Souza) A prophylaxia chimica da malarial—*Folia Med* 1934 Nov 25 Vol. 15 No 33 pp 385-389 [35 refs.]

REPETTO (R.) Un essai de prophylaxie individuelle de la malaria au moyen de l'association plasmochine-atébrine—*Ann Soc Belge de Med Trop* 1935 Dec. 31 Vol. 15 No 4 pp 537-539

BARBOSA (Amando) Experiencias de finca antipalúdica por los medicamentos sin aplicación de ninguna medida antianofídica. [Fighting Malaria by Drugs in the Absence of Anti-Mosquito Measures.]—*Riv ds Malariaologia* Sez I 1935 Vol. 14 No 4 pp 352-368. With 7 graphs. [13 refs.]

In La Bazagona, Spain malaria has been treated by drugs for the five year period 1930-34 and the results are recorded in this paper. Graphs give the prevalence of the forms—benign or malignant tertian—in different subdivisions of the district but these need not be detailed. The general conclusions were that intensive treatment of patients suffering from benign tertian infection did not lessen the incidence by this type in the period under consideration. During that period all with subtertian infection were given combined quinme and plasmochine and the numbers attacked increased steadily year by year—such an increase was not seen when quinine alone was used. There is consequently no advantage in giving the combined drugs. The rise in number of cases in 1934 cannot, it is said be attributed to the (un)

fact that the duration of treatment was reduced, nor does immigration account for the endemic increase, but this question is not discussed in detail.

H H S.

FRANCHI (F) & SAUTET (J) Quininkation préventive et paludisme au cours de manœuvres en pays palustre. [Preventive Quinine during Military Manoeuvres in a Malarious Country]—*Bull. Soc. Path. Exot.* 1935 June 12 Vol. 28 No. 6 pp. 456-460

The authors had experience of preventive quinine during manoeuvres in a malarious district in the south of Corsica, during 1934. They draw particular attention to the wastefulness of this method. If a French soldier contracts malaria he becomes automatically entitled to a pension even though preventive quinine may have made the clinical symptoms negligible. Large doses must be given if they are to prevent symptoms—the dose given to French troops in Macedonia during the war was about 10 grains a day. The advantage of preventive quinine is that a soldier can be kept fit for duty over a special period. When the quinine is stopped the patient experiences a sudden attack of malaria without any stage of invasion—the authors call it "decapitated malaria."

W F

HILL (Rolla B) & OLAVARRIA (José) The Treatment of Malaria with Small Amounts of Quinine.—*J. Amer. Med. Assoc.* 1935. June 29 Vol. 104 No. 23 pp. 2329-2332 [14 refs.]

A three-year trial with a short treatment of 1 gram (15.5 grains) of quinine sulphate daily for 4 days was made at the malaria dispensary of Campo Lugar, a town of 1,200 inhabitants in Spain. The authors concluded that this short treatment was sufficient for fresh benign tertian infections, but that subtertian infections should be treated for a longer period, while some other drug might be tried for the spring relapses.

W F

ANALYA (K. V) GUPTA (Pratik Kumar Sen) Intramuscular versus Intravenous Quinine. [Correspondence]—*Indian Med. Gaz.* 1933 Sept. Vol. 70 No. 9 pp. 533-539

VICONI (M) Ueber Erfahrungen mit Chinin-Well bei Malaria. [On Quinine-Well in the Treatment of Malaria]—*Arch. f. Schiffs- u. Trop. Hyg.* 1935 Oct. Vol. 39 No. 10 pp. 416-422

Report on the results of treatment with quinine-Well of cases of malaria in the Belgian Congo.

At the request of the firm producing quinine-Well the author carried out a series of therapeutic tests with it amongst his patients in the Belgian Congo. The formula of quinine-Well is $C_{21}H_{24}O_4N_4C_{20}H_{34}$. It is free from the bitter taste of quinine. In his observations he used a solution of 20:1,000. His patients were mainly infants and native children of the Congo. He grades the dose according to weight rather than age. From 3 to 15 kilograms the doses of quinine-Well varied from 10 to 50 centigrams per day. The infection was chiefly due to *Plasmodium falciparum*. *Plasmodium malariae* was met with occasionally chiefly in combination with *P. falciparum*. *Plasmodium vivax* was never found.

As a result of his investigations the author concludes that quinine-Weil (60 per cent quinine base) appears to be very similar to quinine bishydrochloride in its action on the malarial infection. As in the case of quinine the gametocytes of *Plasmodium falciparum* are much more resistant to it than the schizonts so that it is frequently necessary to use plasmoquine along with it. The advantages of the drug over quinine particularly in the case of children are absence of bitter taste and milder toxic actions such as giddiness and ringing in the ears.

E D H Greig

MASSIAS (Charles) BOURGIN (P) & NGUYEN VAN TAN Traitement du paludisme par un dérivé acridinique (quinacrine) et un dérivé quinoléinique (rhodoquine). Nouvelles observations. [The Treatment of Malaria by an Acridine Derivative (Quinacrine) and a Quinoline Derivative (Rhodoquine)]—*Bull Soc Méd Chirurg Indochine* 1935 Feb-Mar Vol 13 No 2 pp 79-82.

The treatment given by the authors consists of 5 days quinacrine treatment followed by 5 days treatment with rhodoquine (a drug resembling plasmoquine) and quinostovarsol. The rhodoquine and the quinostovarsol are made up together into tablets which are known as Stovoquine. A saline purgative is given on the first day. The dose of quinacrine is 0.30 gram daily for adults 0.20 for children between 5 and 10 years 0.10 for younger children. The daily dose of rhodoquine is 0.005 gram for every 10 kilograms of body weight. The results of this treatment have been excellent and the authors have observed no toxic symptoms.

W F

MARTIAL (J. E.) La quinacrine dans la tierce maligne. [Quinacrine in Malignant Tertian.]—*Ann de Méd et de Pharm Colon* 1935 Apr-May-June Vol 33 No 2 pp 301-325

The author gives the details of 24 cases of malaria treated with quinacrine (the French atebrin) in French Indo-China. The dose was 0.1 gram three times a day the treatment was continued for 5 days in some cases and for 10 days in others. There were no toxic symptoms and the results were excellent. The author draws attention to the national importance of this drug the discovery of which has made France independent of foreign supplies of quinine and other anti-malarial drugs. He states that it causes the subtertian gametocytes to disappear from the blood. [This is probably a mistake due to the small number of cases observed. Atebrin has no direct action on crescents.]

W F

ROBIN (L.) & TRUONG-VAN HUAN Essais comparés de prophylaxie médicamenteuse antipalustre en région hyperendémique par la praequine associée à la quinine ou à la quinacrine. [A Comparison of Quinine-Praequine and Quinacrine-Praequine as Prophylactics.]—*Bull Soc Path Exot* 1935 July 10 Vol 28 No 7 pp 650-658.

Quinacrine proved more satisfactory than quinine but drugs cannot take the place of antilarval measures.

These experiments were carried out on an isolated rubber estate in the red-earth region of Indo-China. The strictest medical supervision ensured that the drugs were actually swallowed the coolies

were not allowed to associate with people outside no new labour was engaged during the period of the observation. Half the coolies were treated with quinine and the gametocidal drug praequine (which resembles plasmoquine), the other half were treated with praequine and quinacrine (which is identical with atebri). The treatment was continued for 5 months and then stopped. No antilarval measures were taken the coolies used no mosquito nets the carriers were *A. stimulans* and *A. fuscipes*. The drugs had a beneficial effect in both groups, but the spleen-rate the parasite-rate and the gametocyte-rate were much lower in the quinacrine group and the coolies preferred quinacrine to quinine. The cost of treatment was approximately the same. No sooner were the drugs stopped than malaria began to increase, and within a couple of months it was rather worse than at the beginning of the experiment. The authors consider that if drug prophylaxis is to be efficient it must be carried on permanently and that there would always be danger of poisoning if the administration of synthetic drugs were not in the hands of medical men. They conclude that antilarval measures are the best form of prophylaxis and that the association of drug prophylaxis with these gives quicker results.

W F

DE MORAES (Carlos Vieira) A chimica synthetica a servico da terapeia da malaria. (A cura do impaludismo pela atebri + atebri plasmochina.) [Atebri with and without Plasmochina in Malaria.]—*Rev. Paulist. Med. e Cirurg.* 1935 Oct. Vol. 31 No. 4 pp 355-377 With 8 charts.

Eight cases are detailed, seven with *P. vivax* infection, one with *P. falciparum*. The point chiefly worth noting is that the author found the chloride of atebri given intramuscularly for 10 days in doses of 0.125 gm. more successful as a gametocide than atebri, possibly because when injected it was able to act more readily than the tabloids of the combined drug.

H H S.

FERNANDEZ (Alberto J.) Notas practicas sobre el tratamiento del paludismo. Comunicación hecha en las reuniones de la Polyclínica Caracas. [The Treatment of Malaria.]—*Rev. Polyclínica Caracas* 1935 Aug. Vol. 5. No. 23. pp. 1553-1558.

This was a paper communicated to a meeting of the Caracas Poly clinic and relates some personal experiences with plasmoquine and atebri in the treatment of malaria in Venezuela. Most of the cases were of patients suffering from severe first infections of *P. falciparum*. The author's experience coincides with that of others who have reported on these drugs.

H H S.

CAMPAGNOLI (G.) La chinoplasmina nella terapia della malaria.—*Riv. di Veterinaria*. Sez. I. 1935 Vol. 14. No. 5. pp. 404-423. French summary (7 lines)

DAWSON (W T) GROCRICH (Wendell) & HOULLAR (E. D.) Intravenous Toxicity of Atabrine (Atebri).—*Am. J. Trop. Med.* 1935 Sept. Vol. 15. No. 5. pp. 515-520. (14 refs.)

Intravenous injections of atebri should be given only in emergency. The injection should be given slowly and the dose should not exceed 0.1 gram. The toxicity of atebri intravenously is 20 to 40 times

greater than that of atebrin by the mouth. [See BRIERCLIFFE Ceylon Epidemiol ante p 218]

The authors inoculated atebrin into rabbits by the ear vein. They found that provided the injection was made very slowly 0.003 gram per kilogram was fairly safe. This corresponds roughly to 0.2 for an adult man. The injection of 0.005 gram per kilogram if completed within one minute caused a mortality of 20 per cent. It is not always safe to calculate directly from the figures obtained from animal experiments the doses which should be given to human beings. For example rabbits may survive a dose of morphine amounting to 300 milligrams per kilogram of body weight given intravenously but in man 1 milligram is dangerous. Many references to papers on the toxicity of atebrin are given. A patient of Eckhardt's tolerated a dose of 0.3 gram but on the following day 0.4 gram was followed 2 hours later by violent vomiting, collapse, weak pulse and stupor. He was revived by hot coffee and there were no sequelae. The dangerous doses in milligrams per kilogram in laboratory animals are as follows — *Rabbits* by mouth 400 subcutaneous 75 intravenous 7 *Cats* mouth 200 subcutaneous 100 intravenous 10 *White mice* mouth 1,000 subcutaneous 500 intravenous 50. The authors consider that in view of its slow excretion there should be an interval of 8 weeks between courses of atebrin and that it should be taken only under medical supervision.

W F

DE MURO (Paolo) L'atebrin nella cura dell'infezione malarica. [Atebrin in Malaria].—*Riv d' Malariaologia* Sez. I 1935 Vol 14 No 4 pp 325-343 [87 refs.] French summary

The action of atebrin in 25 cases of malaria is discussed. Five patients were suffering with first attacks of benign tertian fever, another five with relapsed benign tertian four from primary subtertian five with relapsing subtertian three with quartan and three with mixed benign and subtertian fever. The dosage employed by the author is For children under one year $\frac{1}{2}$ tablet or 0.05 gm. daily for those between 1 and 3 years $\frac{1}{2}$ tablet or 0.075 gm. 3-6 years 0.1 gm. 6-10 years 0.2 10-12 years 0.25 and for adults 3 tablets or 0.3 gm. in each case given for 8 days. The usually recommended 5-day course he finds insufficient for the Agro Romano strain of parasite. He gives the drug in a single dose and never on an empty stomach. In the cases of benign tertian and quartan infections the fever is cut short in 2-3 days in the subtertian not for 4-6 days. Few showed any intolerance four exhibited a yellowish discolouration one suffering with relapsed benign tertian complained of abdominal pain and one with primary subtertian slight headache which lasted for 3 days.

H H S

CHOPRA (R. N) & ROY (A. C) On the Estimation of Minute Quantities of Atebrin in the Blood.—*Indian Med Gaz* 1935 Sept. Vol 70 No 9 pp. 504-505

The atebrin is extracted from the blood by means of ether. This is evaporated and the residue is dissolved in decinormal hydrochloric acid. Caustic soda and amyl alcohol are then added. The amyl alcohol forms a supernatant layer which takes up all the yellow colour of the solution. This is compared with atebrin solutions of known strength.

W F

VARDY (E. C.) Notes on a Clinical Investigation of the Treatment of Malaria by Atebrin Mesonat Injections.—*Malaya Med. J.* 1935 Sept. Vol. 10. No. 3 pp 67-77 With 5 charts.

Atebrin mesonate was given to 50 serious cases. In 32 the patients were cured within 48 hours. In two the drug had no effect, and quinine was given. In two the drug may have had a toxic action.

Fifty patients at the Tan Tock Seng Hospital in Singapore were treated by injections of atebrin mesonate. The manufacturers state that the two sizes of ampoules supplied by them contain a quantity of a very soluble atebrin salt corresponding to 0.1 gram and 0.3 gram, respectively, of atebrin hydrochloride. The acid constituent of this salt is without any toxic or therapeutic action. The daily dose for adults and for children over 8 years is 0.3 gram atebrin; for children up to 4 years 0.1 gram; for children between 5 and 8 years, 0.2 gram. The daily dosage may be injected all at once. The total dosage recommended is 0.6 gram in 48 hours, then no more. For intravenous administration it is advisable not to exceed the single dose of 0.1 gram in adults. The injection should be made slowly and two to three doses may be given in 24 hours. "In parenteral use," states the makers, "atebrin is best injected intramuscularly." Only two of the author's patients were given intravenous injections. Thirty-five were suffering from subtertian 10 from benign tertian and 5 from mixed tertian. They were all selected for this treatment because they were seriously ill. Nevertheless, in 21 cases, a "temperature-pulse-rate response" occurred—that is to say the temperature and pulse began to fall directly after the first injection and within 4 to 12 hours had reached a normal level; in a short time the patients were sitting up and asking for food. In 11 cases the temperature did not come down immediately after the first injection, but it did so after the second and remained normal until discharge. These two types of response the author calls Type I and Type II. In Type II the pulse takes 48 to 72 hours to reach the normal rate. There were 10 patients who gave what the author calls a Type III response. Here the temperature took 3 or 4 days to come down, but when it was once down to normal it remained there. Finally in 2 cases there was no response at all, and, after 0.9 gram had been given, they were treated with quinine. As regards the effect on the parasites *P. vivax* disappeared in 2 or 3 days and *P. falciparum* in 4 or 5. In a healthy volunteer the ordinary doses caused no destruction of erythrocytes, but, in the malaria patients, its administration was followed by a fall of 5 to 15 per cent. of haemoglobin, probably due to the destruction of infected corpuscles. One patient had a fit which may have been due to the drug. Another, with cardiac lesions, died 12 hours after his first injection. Atebrin was found in the urine within 2 hours of its intramuscular injection and the author therefore considers it unnecessary to give it intravenously. (See BLAIZ and SIMSOMS, this Bulletin 1935 Vol. 32, p. 748 HICKS *et al.* p. 235 and also BRUNCLIFFE, *et al.* p. 218.) W. F.

VAN SLYKE (W.) Du traitement du paludisme chronique de l'enfant noir par un nouveau sel d'atebrine. [Atebrin Mesonate.]—*Bull. Soc. Path. Exot.* 1935. Oct. 9. Vol. 28. No. 8. pp. 701-705.

The author compares the action of atebrin mesonate with that of atebrin dihydrochloride, or "atebrin for injection." He found that atebrin mesonate had a much slower action but he recommends it

for chronic cases. The powder keeps well in the tropics and the injections cause neither pain nor local reaction. [See report on Ceylon Epidemic ante p 218] W F

FERNANDO (P. B.) & WIJERAMA (E. M.) Death after Injection of Atebrin Musonate.—*Lancet* 1935 Nov 9 p 1056.

A man aged 20 was treated for malaria by two intramuscular injections of atebrin musonate which were given at Kurnegalle Hospital. He had no more fever until two months later when he was admitted to the General Hospital, Colombo with a history of three days fever rigors and vomiting. His temperature was 99° F his pulse 130 his skin was yellow and he was very ill. His urine contained no bile albumen or atebrin. No parasites were found in his blood. The direct and indirect van den Bergh tests were positive. He died two days later. All the tissues were stained yellow. Atebrin was found in fluid from the pericardial and pleural sacs. No malaria parasites were found in the organs or tissues but malaria pigment was present in the liver and spleen. The liver was moderately enlarged and congested. There were no macroscopic changes in the kidneys but the microscope showed proliferation of the cells of Bowman's capsule. [The authors do not state how they satisfied themselves that the patient had received no atebrin prior to admission except the intramuscular injections two months before] W F

CHOPRA (R. N.) SEN (B.) & GANGULI (S. K.) Tebetren in Indian Strains of Malaria.—*Indian Med Gaz* 1935 July Vol 70 No 7 pp 362-366

Its action resembles that of quinine, but it costs much more. Tebetren is a combination of acridine and quinine derivatives with a derivative of cholic acid. The authors treated 22 patients with 3 tablets 3 times a day for 5 days and then kept them under observation for a fortnight. They found that Tebetren resembles quinine and atebrin in its action on Indian strains of malaria. As compared with cinchona alkaloids the drug is much more expensive and appears to have no particular advantage over them. W F

USPENSKAYA (M.) Treatment of Quartan Malaria with Plasmocid.—*Med Parasi & Parasitic Dis* Moscow 1935 Vol. 4 No 3 [In Russian pp 234-235]

The author reports successful treatment of 32 cases of quartan malaria in the Caucasus with plasmocid. The course of treatment is divided into at least 4 cycles in each of which the drug is given in doses of 0.03 gm. 3-4 times a day 3 days in succession followed by an interval of 4 days without treatment C A Hoare

SCHULEMANN (Werner) Die Wirkung der synthetisch dargestellten gegen Malaria wirksamen Arzneistoffe.—*Riv di Malariologia* Sez II 1935 Vol. 14 Supp to No 3 pp 33-52. With 2 plates [80 refs]

KARAPETJAN (E. G.) Vergleichende Beurteilung der Behandlungsmethoden der Malaria.—*Arb d Tropeninstiitut d Volkgesundh Kommissariat d SSR. Armenien* 1935 Vol. 2. [In Russian pp 339-341 German summary pp 367-369]

RIOLO (Pietro) La terapia adrenalinica venosa delle splenomegalie malariche. [The Treatment of Malarial Splenomegaly by Adrenalin Intravenously]—*Riv di Malariaologia* Sez. I 1935 Vol. 14 No. 3. pp 248-262. [11 refs.]

The author's routine for treating malaria patients with splenomegaly by means of intravenous injections of adrenalin was to start with 0.01 mgm. in 1 cc. distilled water and increase by 0.01 mgm. to 0.1 or even 0.2 mgm. if well tolerated. On reaching the maximum dose this was repeated for some 20 days till the splenic enlargement disappeared or was no longer undergoing reduction. It was noted that the blood picture also improved and might even become normal.

The author treated 18 patients whose histories are given in this article. The degrees of enlargement were I Spleen palpable. II Extending to "the lower half of the space between the costal arch and the umbilicus. III. Extending below the umbilicus. IV To the iliac fossa.

Among the 18 there were One in stage I 7 in stage II 9 in stage III and 1 in stage IV. In the one in stage I the spleen could no longer be felt at all of the 7 in stage II in 4 it could no longer be felt, in 2 it was just palpable in one there was "marked reduction" [not defined]. Of the 9 in stage III it was not felt at all in 3 just palpable in 4 and reduced to stage I in the other two. Lastly in the case of the one with the great enlargement stage IV after treatment the spleen was only just palpable. Nothing is said of any other treatment, such as quinine being given at the same time the results seem to be due to the adrenalin only

H H S.

CICCHITTO (Angelo M.) Contributo al trattamento delle splenomegalie malariche ai tropici. La soluzione citrata di Normet sola o associata all'adrenalina endovenosa, nelle splenomegalie malariche croniche. [Treatment of Malarial Splenomegaly]—*Riv di Malariaologia* Sez. I 1935. Vol. 14 No. 5 pp. 391-403. French summary

The author refers to previous records in which reduction of an enlarged spleen due to chronic malaria was obtained by injections of Normet's citrate solution (sodium citrate 52 gm. magnesium citrate 10 gm. iron potassium tartrate 3 gm. manganese citrate 0.005 gm. sq dest. one litre) and the modified formula (sodium citrate 22 gm. calcium citrate 6.5 gm. citrate of magnesium 4.5 gm. Ferri et ammon. cit 1 gm. manganese citrate 0.005 gm. water 1 litre). He then mentions 20 patients in whom better results were obtained by combining the second formula of Normet with adrenaline intravenously injections being given daily with increasing doses of adrenaline solution starting with 1/100 mgm. then 1/50 1/20, to 1/10 or even 1/10 mgm.

Of 60 Somalis 20 were given Normet No. 1 20 Normet No. 2, and 20 Normet 2 + adrenaline. Among the first 9 showed marked and 5 slight improvement of the second in 7 the spleen was reduced to normal limits 9 showed a spleen reduced to 1-2 fingers breadths below the costal margin and 4 were slightly reduced with the combined citrates and adrenaline 13 had a spleen reduced to normal, 5 to 1-2 fingers breadths below the ribs and only 2 showed but a slight reduction. Nine who had had "slight reduction" were some

months later given the mixed treatment in 4 the reduction was to normal, in 2 the spleen was still palpable below the ribs in the other three there was no change
H H S

STARK (Wilhelm) Ueber Splenektomie bei Malaria-splenomegalien [Splenectomy for Malarial Splenomegaly]—*Arch f Schiff- u Trop Hyg* 1935 Sept. Vol. 39 No 9 pp 374-381

An account of splenectomy in 32 cases of malarial splenomegaly. The majority were between the ages of 20 and 40 years the youngest patients (2) were 12 years and the oldest (2) 45 years. In addition to splenomegaly the following features were noted in the cases—hepatomegaly (18) ascites (2) jaundice (2) marked cachexia and anaemia (3) cardiac changes disturbances of the sexual functions e.g. infantilism (2) and one obstinate case of eczema. The author describes the technique of the operation. He lost 6 cases giving an operation mortality of 18.7 per cent. The clinical results of the operation were considered satisfactory. Red cells with Jolly bodies were noted in the course of his study of the blood changes following the operation. From his investigations he considers that in splenectomized patients the functions of the spleen are assumed gradually by other organs such as the bone marrow and reticulo-endothelial system
E D W Greig

SCHWERTZ (J) Recherches morphologiques sur un *Haemoproteus* spécial et deux *Plasmodiums* du hibou *Syrnium nuchale* et sur deux *Plasmodiums* du petit tisserin *Brachycole anomala* (Fam. Ploceidae) [Researches on Avian Malaria.]—*Riv d' Malaria* Ser I 1935 Vol 14 No 3 pp 214-247 With 1 text fig & 2 coloured plates. [14 refs.]

In 1930 the author described as *Plasmodium fallax* a new malarial parasite which he had found in the Belgian Congo in the owl *Syrnium nuchale*. It occurred in association with a *Haemoproteus* and resembled *P. circumflexum* subsequently described by KIKUTH (1931) in its schizonts which occupied the length of the red blood corpuscle on one side of the nucleus. As the infection was a mixed one with a *Haemoproteus* it was difficult to determine the character of the gametocytes. The author has had an opportunity of studying 14 owls which were examined over varying periods. He has discovered that this owl is liable to infection with two species of malarial parasite one of which is *P. praecox* (*relictum*) and the other *P. fallax* which moreover is unlike *P. circumflexum* in that it has elongate instead of rounded gametocytes. The *Haemoproteus* is identified as *H. syrnii* Mayer. The weaver bird (*Brachycole anomala*) was found to harbour two parasites *P. praecox* and *P. elongatum*. The various parasites described are illustrated in two coloured plates.
C M Wenyon

HUFF (Clay G) *Plasmodium hexamerium* n. sp from the Bluebird, Inoculable to Canaries.—*Amer Jl Hyg* 1935 Sept. Vol. 22 No 2 pp 274-277 With 16 figs. on 1 plate

The new species of bird malarial parasite here described has as its main characters schizonts not larger than the nuclei of the red cells and producing very regularly six merozoites and elongate gametocytes.

P. rengkawi and *P. tenuis* are very similar but produce from 4 to 8 merozoites while *P. rouxi* invariably gives rise to 4 merozoites. It is possible that *P. tenuis* is identical with *P. rengkawi*, in which case it will be a synonym. The 4 parasites are closely related. The new species illustrated in a plate was studied in the canary in which it was isolated from a blue bird (*Sialia sialis sialis*). The parasite was also found in the Maryland yellowthroat, the catbird (*Geococcyx carolinensis*) and the mourning dove.

C M W

BUXTON (P. A.) The Effect of *Proteosoma* upon the Survival of *Culex*.—*Parasitology* 1935 Oct. Vol. 27 No. 4 pp. 547-551.

The paper describes a number of experiments in each of which one group of *Culex fatigans* was fed on a bird, the blood of which contained gametocytes of *Proteosoma* the other on an uninfected bird. In each case the mosquitoes fed on the infected bird showed a tendency to die earlier than the controls. It is pointed out that this observation has no immediate relation to problems of human malaria, but it should be easy to test whether an infection with the species of *Plasmodium* which occur in man shortens the life of *Anopheles*. It appears to be possible that some species of *Anopheles* do not carry malaria in nature because they readily become infected with results fatal to themselves.

P A Buxton

MOCHIKOWSKI (Ch.) Au sujet des méthodes de la chimothérapie expérimentale du paludisme [Experimental Chemotherapy in Malaria].—*Bull Soc Path Exot* 1935 July 10. Vol. 28 No. 7 pp. 639-650.

Investigations have been carried on in Moscow during the last 5 or 6 years in connexion with the synthesis of antimalaria drugs and their evaluation. Birds infected with *P. schizans* and with *Haemoproteus* have been employed for testing the action of the drugs on the schizonts and the gametocytes respectively. This paper describes the manner in which the value of a drug is calculated from DT *dosis tolerans* — the maximum tolerated single dose DTR *dosis tolerans repetita* — the maximum dose which can be repeated daily without danger DP *dosis paroxysmica* — the smallest single dose which causes the parasites to disappear DPR *dosis paroxysmica repetita* DA *dosis affectans* — the dose which slows down the multiplication of the parasites DR *dosis retardans* — the dose which delays the appearance of parasites in the peripheral blood DRR *dosis retardans repetita* DD *dosis disflagellans* — the dose which prevents exflagellation of gamete.

W F

HAMM (E. A.) Old and New Remedies in the Treatment of Malaria.—*Bombay Med. Jl.* 1935 Aug & Sept. Vol. 4 Nos. 8 & 9. pp. 134-138 & 145-150 [20 refs.]

SWEENEY (W. W.) Intravenous Administration of Certain Drugs in the Therapy of Avian Malaria.—*Amer Jl. Trop. Med.* 1935 Sept. Vol. 15 No. 5. pp. 529-544 [With 6 figs.]

This concerns mercurochrome and 3 other drugs.

There have been many conflicting reports about the efficacy of mercurochrome in malaria. AVISON and KOO of Severeace Union

Medical College in Korea have reported that all their cases were cured by intravenous injections of the drug. The author treated canaries infected with *P. cathemerium* and came to the conclusion that it was not of sufficient value to warrant its use. This is also probably true of human malaria but it may be of some value as an adjunct to other drugs or in cases where there is an idiosyncrasy to other malariacides. Carbarsone and vioform were also tested and found useless.

W F

- i. VAN ROOYEN (C E) & PILE (G R). Observations on Infection by *Plasmodium knowlesi* (Ape Malaria) in the Treatment of General Paralysis of the Insane.—*Brit Med Jl* 1935 Oct. 12. pp 662-666 With 2 charts.
- ii. BRITISH MEDICAL JOURNAL 1935 Oct. 12. pp 672-673—Monkey Malaria in G.P.I.

i. Most patients were readily infected. The disease was quickly arrested by quinine, but contrary to experience elsewhere atebrin had no effect on it. The symptoms were milder than those of benign tertian.

Twelve patients were inoculated intramuscularly or intravenously with 3 to 5 cc. of blood containing *P. knowlesi*. The intravenous route is to be preferred. Some patients were inoculated with blood from other human cases but in most of them the blood was obtained from a monkey by cardiac puncture. Infected defibrinated blood, kept at 0°C. in the refrigerator was still infective for a monkey after 18 days. The incubation period usually lasted for about a week. The fever was quotidian. It should be checked after the 8th rigor by a dose of quinine as little as 7½ grams of the drug given intramuscularly is sufficient to deal with a massive infection. Although the drug atebrin acted specifically in the monkey its administration failed to diminish the pyrexia or inhibit the multiplication of parasites in cases of human infection. The susceptibility of the patients varied, the majority were readily infected, a few were more resistant, particularly two who had been previously infected with *P. vivax*. *M. schenckii* was reinfected with *P. knowlesi* after passage through two human patients.

ii. The strain of *P. knowlesi* employed by Drs. van Rooyen and Pile was brought to England two years ago in an infected monkey by Major G Covell, I.M.S. and has been maintained at the London School of Hygiene and Tropical Medicine by passage through monkeys. It is still as virulent as when it was first introduced. Passage in man causes attenuation both for man and monkey. Infected blood has been sent through the post from London to various other centres in Europe and America the maximum period successfully withstood was 12 days. Patients infected with *P. knowlesi* at Horton Mental Asylum by Colonel S P James and Dr W D Nicol have not exhibited any such resistance to atebrin as is recorded by Drs. van Rooyen and Pile.

W F

NICOL (W D). Monkey Malaria in G.P.I. [Correspondence].—*Brit Med Jl* 1935 Oct. 19 p 760

P. knowlesi is not as useful as *P. vivax* or *P. malariae* for the treatment of general paralysis.

Only about 45 per cent. of people who have never had malaria, and a still smaller proportion of those who have had it, are susceptible to infection with *P. knowlesi* transmitted by blood inoculation; moreover in 25 per cent. of those infected, the attack is abortive and therapeutically useless. Passage from man to man lowers the virulence of the parasites, and, as it cannot be cultivated in mosquitoes, it would be necessary to go to the inconvenience of keeping monkeys if *P. knowlesi* were brought into general use. The employment of *P. vivax* can be regarded as both safe and efficient. W F

- SOUTHERN MEDICAL JOURNAL 1935, Aug Vol 28, No. 8, pp. 738-764 —Symposium on Malaria.
- HANSON (Henry) The Need for Continued Malaria Research (pp. 738-739).
- CRAIG (Charles F.) Report of the Subcommittee on Malaria Research of the National Malaria Committee (p. 739).
- MELENKY (Henry E.) Recent Research upon the Malaria Parasites (pp. 739-742 [21 refs.]).
- GINGRICH (Wendell) Recent Research upon the Diagnosis of Malaria (pp. 742-746 [37 refs.]).
- CLARK (Herbert C.) Recent Research on Therapeutics of Malaria (pp. 746-749 [31 refs.]).
- MAYNE (Bruce) Recent Research on Malaria Therapy of Venereal Diseases. Review of Progress in the New Researches of Malaria Therapy of Venereal Diseases (pp. 750-753 [37 refs.]).
- RILEY (George E.) FAUST (Ernest Carroll) & COOK (S. S.) Some Recent Advances in the Epidemiology of Malaria (pp. 753-757 [36 refs.]).
- FAUST (Ernest Carroll) & DIBOLL (Celeste Goff) Malaria Mortality in the Southern United States for the Year 1933 (pp. 757-763. With 2 figs.).
- BOYD (Mark F.) A Review of Malaria Control Activities in the Southern States during 1934 (pp. 763-764).

Mingivings concerning malaria control.

This symposium should be of great value to those interested in malaria because it contains reports from the subcommittee on the subject of malaria research during 1934 with references to a large number of papers published during that year. Particularly interesting are the paragraphs dealing with the treatment of early syphilis by therapeutic malaria, and the treatment of general paralysis by means of the radiotherm which, according to HINSZIE and BLALOCK, gives better results than malaria.

Dr Henry Hanson State Health Officer of Florida, took the chair at the annual meeting of the National Malaria Committee, at St. Antonio Texas in November 1934. His opening address was definitely pessimistic. He said that the eradication of malaria was not appreciably nearer than it was when the Committee was formed in 1916. The best that could be hoped for was to accomplish a fair degree of control. He calculated that some 50,000 cases occurred annually in Florida. "What to do about it is the question asked by those responsible for furnishing funds for control. We ask do we know what to do about it? Rashly some would answer yes! There are extensive areas where it is out of the question to use the Canal Zone methods as practised prior to 1919. In Florida it is impracticable

to attempt a general drainage program areas, some swamp where no attempt should be made to control Anopheles by drainage oiling or dusting Individual protection must be resorted to which almost without exception will be in the form of screening that is, mosquito-proofing the house and proper treatment of cases The important thing is to choose effective preventive measures compatible with the economic status of the community concerned."

Dr Mark Boyd reviewed the malaria situation in the south-eastern States. The drainage programmes of Georgia and Mississippi were given a tremendous impetus by the relief funds for providing work for the unemployed. Owing to the hurried manner in which many of these projects were prepared and executed time will be required to determine their actual effect on malaria incidence All State activities are now confronted with the question of providing for the maintenance of this drainage a problem of no mean magnitude All in all, the present status of the malaria situation is disquieting. The rising incidence of the past few years indicates that the fairly steady decline experienced in the decade previous to 1931 can only to a limited extent be attributed to deliberate control work.

In an editorial on malaria incidence in the Southern States during 1934-5 it is stated that there were over 5 million cases during the year Twelve hundred miles of drains were dug by labour working under the relief schemes but it is feared that if these drains are not maintained they may become breeding places for *A. quadrimaculatus* and cause malaria instead of preventing it.

II F

SERGENT (Edmond) La prémunition dans le paludisme [Pre-munition in Malaria.]—*Rev d' Malariaologie* Sez. II 1935 Vol 14 Supp to No. 3 pp 5-25 With 4 figs.

Only when one has malaria is one immune to malaria.

The author discusses and contrasts three kinds of immunity (1) Innate resistance. He proposes this term for a natural congenital immunity which exists apart from infection such for example as the immunity of man to the parasites of bird malaria (2) True immunity He designates by this term the post infectious immunity conferred by certain infectious diseases such as typhoid fever and scarlet fever after they have been cured and after the host has been sterilized. (3) Premunition. This term was proposed in 1924 by the author PARROT and DOYATIEN to indicate an immunity which depends upon the continued presence of the infective agent in the body and which ceases when that infection disappears. In syphilis for example, an infected man is immune to superinfection but directly he is cured his immunity disappears. In tuberculosis too the Calmette-Guérin living vaccine produces a mild latent infection which while it lasts immunizes but with the disappearance of the infection the immunity disappears too the inoculation of dead vaccines produces no immunity in such diseases. In many protozoal diseases such as piroplasmosis and trypanosomiasis immunity is of the same kind it is a premunition due to the persistence of infection The author then proceeds to discuss the question of immunity in malaria. He does not agree that the immunity of black races is due to an innate, congenital resistance but considers that it is acquired by means of infections contracted in infancy This immunity is not a true

immunity" but is due to the persistence of malaria parasites it is a premunition. Premunition is concurrent with infection it begins and ends with the infection. A single inoculation suffices to produce lasting premunition in bird malaria, but in man it must be sustained by repeated remissions.

W. F.

SEXTON (J. A.) & HARRIS-GWYNNE Studies in Immunity in Malaria. Part IV The Results of Multiple Heterologous Superinfection, with a Discussion of their Relationship to Some Epidemiological Problems and to the General Principles of Treatment.—*Records of the Malaria Survey of India*. 1935. Sept. Vol. 5 No. 1 pp. 307-334 [17 refs.]

Two or three infections with different strains produced protection against clinical manifestations of infection with most, but not all, other strains. The results of the experiments are considered in relation to human malaria. In ordinary tropical practice it is unsafe to delay or modify treatment in an attempt to encourage the development of immunity. Prophylactic quinine is discussed.

The authors used monkeys which had already been inoculated with several strains of monkey malaria by MULLIGAN and Sinton (*the Bulletin* 1934 Vol. 31, p. 482) and they repeated the inoculations until each animal had been inoculated with 6 strains. The inoculations were separated by an interval of 2 or 3 months. Six monkeys were employed, and in 5 of them no clinical relapse followed the second, or any later, inoculation with a heterologous strain. Usually the heterologous strain produced a parasitic relapse without symptoms. The result of the inoculation of the 6th heterologous strain was to cause a transient increase of parasites in 4 cases, in one, it had no effect. The sixth monkey died from malaria after the inoculation of the 5th heterologous strain. The results "suggest that when an animal has acquired a tolerance to two or more of our different strains of *P. knowlesi* a high degree of protection is produced against the acute clinical manifestations of superinfection. This protection does not however appear to give an immunity against superinfection with all other strains of parasite in every case." It appears that each strain possesses several different immunological elements, some of which are common to other strains, and this explanation was put forward by MULLIGAN and Sinton (*ibid.*). The authors suggest, however, that each of their so-called "strains" may really be a mixture of several pure strains, arising from a multiple infection with the same species in the original monkey host. They point out that all their animals came from the same area and that, consequently the infections might merely represent mixtures of strains occurring in the natural environments of these monkeys. They consider that no general conclusions can be drawn to the effect that infections with 2 or 3 strains are sufficient to give a high degree of tolerance towards later infections with other strains of the same species.

They then discuss the results of their monkey experiments in relation to the treatment of human malaria, and the question of either allowing malarial infections to run on to spontaneous cure, or of giving only a minimal amount of treatment with the view of allowing the development of tolerance. They are of opinion that "while such a procedure may be possible, safe, and advisable under special conditions, such as those in mental, and other well-equipped and well-staffed hospitals,

It does not seem suitable for routine use under the ordinary conditions of tropical practice. Where people live in areas of low endemicity and where reinfection with the same strain of parasite is unlikely to occur they recommend that treatment should be directed towards the production of a radical cure. In regions of high endemicity on the contrary treatment should be limited to clinical cure in order to cut short the attack and obviate the risk of a fatal result. It is pointless to aim at a radical cure when reinfection is constantly occurring and it appears that in order to maintain tolerance it is necessary for the individual to continue to harbour parasites. Where people are exposed to frequent infection over comparatively short periods for example troops sent into malarious areas clinical prophylaxis is recommended. Six grains of quinine daily may be sufficient for soldiers but for large undisciplined bodies of men one must rely on larger doses given at longer intervals. Prophylactic treatment usually keeps the parasites below fever level but they are numerous enough to stimulate the development of tolerance and when the drug is stopped the attacks which develop in those not radically cured will be usually less severe than those seen in primary infections. W F

DE SANCTIS MOVALDI (Tullio) Ricerche sulla malaria sperimentale da inoculazione di sporozoi. [Malaria experimentally set up by Inoculation of Sporozoites.]—*Riv di Malariaologia* Scz. I 1935 Vol. 14 No 4 pp 344-351 French summary

For these experiments sporozoites from the glands of Anopheles were inoculated into human subjects, some intradermally some subcutaneously and some intravenously. Those of *P vivax* were used. Subcutaneous injections in quantities from 2,500 to 100,000 were barren of result. Intradermal inoculation of 5,000 was followed 74 days later by an attack but others injected with 50,000 and 90,000 exhibited no signs of infection. Intravenous inoculations of the same doses in 3 out of 7 cases were followed in 15 or 17 days by typical attacks.

H H S

SAUTER (Jacques) Influence du froid sur les oeufs d'Anopheles maculipennis [The Influence of Cold upon the Eggs of *A. maculipennis*]—*C R. Soc Biol* 1935 Vol. 120 No 32 pp 412-413

The author kept mosquito eggs at a temperature of 4°C. and controls of the same batch at ordinary temperatures. In the cold season eggs laid by reactivated hibernating females hatched in 6 to 7 days at laboratory temperature but if they were kept at 4°C they did not hatch even if they were taken out of the ice chest after 6 or 7 days at 4°C and were then kept at ordinary temperature. In the hot season eggs kept at 4°C. hatched in 15 to 25 days. The vitality of the eggs of active females is much greater than the vitality of the eggs laid by hibernating females.

W F

POKROWSKI (S W) Essai d'obtenir les pontes hivernales d'Anopheles maculipennis en conditions de laboratoire. [Obtaining Eggs of *Anopheles maculipennis* under Laboratory Conditions in Winter]—*Rev Microbiol Epidémiol et Parasit* 1935 Vol. 14 No 3 [In Russian pp 299-301 French summary p 301]

A maculipennis var *typicus* and *mecesae* are the most frequently encountered mosquitoes in hibernation in central URSS. If provided

immunity" but is due to the persistence of malaria parasites it is a premunition. Premunition is concurrent with infection it begins and ends with the infection. A single inoculation suffices to produce lasting premunition in bird malaria, but in man it must be sustained by repeated reinfections.

W F

SINTON (J. A.) & HARRAGAN. Studies in Immunity in Malaria. Part IV. The Results of Multiple Heterologous Superinfection, with a Discussion of their Relationship to Some Epidemiological Problems and to the General Principles of Treatment—Records of the Malaria Survey of India. 1935 Sept. Vol. 5, No. 1 pp. 307-334 [17 refs.]

Two or three infections with different strains produced protection against clinical manifestations of infection with most, but not all, other strains. The results of the experiments are considered in relation to human malaria. In ordinary tropical practice, it is unsafe to delay or modify treatment in an attempt to encourage the development of immunity. Prophylactic quinine is discussed.

The authors used monkeys which had already been inoculated with several strains of monkey malaria by MULLIGAN and Sinton (*the Bulletin* 1934 Vol. 31 p. 462) and they repeated the inoculations until each animal had been inoculated with 6 strains. The inoculations were separated by an interval of 2 or 3 months. Six monkeys were employed, and in 5 of them no clinical relapse followed the second, or any later, inoculation with a heterologous strain. Usually the heterologous strain produced a parasitic relapse without symptoms. The result of the inoculation of the 6th heterologous strain was to cause a transient increase of parasites in 4 cases. In one, it had no effect. The sixth monkey died from malaria after the inoculation of the 5th heterologous strain. The results "suggest that when an animal 'acquires' tolerance to two or more of our different strains of *P. knowlesi*, 'a high degree of protection is produced against the acute clinical manifestations of superinfection. This protection does not however appear to give an immunity against superinfection with all other strains of parasite in every case.' It appears that each strain possesses several different immunological elements, some of which are common to other strains, and this explanation was put forward by MULLIGAN and Sinton (*ibid*). The authors suggest, however, that each of their so-called "strains" may really be a mixture of several pure strains, arising from a multiple infection with the same species in the original monkey host. They point out that all their animals came from the same area and that consequently the infections might merely represent mixtures of strains occurring in the natural environments of these monkeys. They consider that no general conclusions can be drawn to the effect that infections with 2 or 3 strains are sufficient to give a high degree of tolerance towards later infections with other strains of the same species.

They then discuss the results of their monkey experiments in relation to the treatment of human malaria, and the of malarial infections to run on to spontaneous remission with the minimum amount of treatment, with the view to the development of tolerance. They are of opinion that such may be possible, safe, and advisable under conditions in mental, and other well-equipped

allowing only development such

places of this particular species for this a knowledge of the larvae is required. As an example of this species sanitation the lecturer mentioned a valley in the interior of Sumatra where malaria was endemic and mosquitoes were breeding everywhere. It was impracticable to deal with all the breeding places but it was found that the only carrier was *A. ludlowi* the larvae of which were limited to certain ricefields used as fish ponds. When these ponds were done away with, malaria disappeared it was unnecessary to deal with the other anophèles. The north coast of Java is highly malarious. Two closely related anophèles are found there *A. ludlowi* and *A. rossi*. *A. ludlowi* is responsible for the malaria, but *A. rossi* is not a carrier. Species sanitation is possible here because *A. ludlowi* breeds in salt water only while *A. rossi* breeds everywhere. The systematic entomologists recognize *A. ludlowi* and *A. rossi* as different species though the morphological distinctions are small but they recognize no difference between the *A. ludlowi* of Java which breeds only in salt water and those of Sumatra which breed in fresh water yet it is just this biological peculiarity which has made it possible to deal with malaria on the coast of Java. Thus a sanitarian may court disaster if he relies on systematic entomology alone for a given species does not always behave in the same way in one country as it does in another. A striking example of this occurred on the East coast of Sumatra towards the end of the War the tobacco planters had great difficulty in feeding their coolies and they decided to plant rice for their benefit. The rice fields in the plains of Java and Borneo breed swarms of anophèles but there is no malaria because these anophèles are *A. hyrcanus* which does not act as a carrier there. In the deltas of the Yang Tse and the Ebro in Macassar and in the Celebes this same mosquito is plentiful but harmless. Consequently the planters of Sumatra had no fear that the new rice fields on the East Coast plains where *A. hyrcanus* breeds would prove unhealthy. Unfortunately malaria soon appeared in epidemic form and WALCH showed that the carrier was *A. hyrcanus* which he found infected in high proportion. It is also the principal vector in other parts of Sumatra. It is therefore different from the harmless *A. hyrcanus* of Java and other parts of the world, though from the entomological point of view it is the same. Professor Swellengrebel next spoke of the *A. gambiae* of South Africa which breeds in small pools of water free from weeds and exposed to the sun, while the same species throughout the rest of Africa prefers the stagnant water of marshes. In conclusion he touched upon the question of the fresh water (non-carrying) and the salt water (carrying) races of *A. maculipennis* which are found in Holland. [See SWELLEN GREBEL, ante p 221.]

W F

BAKER (F. C.) The Effect of Photoperiodism on Resting, Treehole Mosquito Larvae. (Preliminary Report.)—Reprinted from Canadian Entomologist 1933 July pp 149-153

The cessation of growth in the larvae of certain of tree-hole mosquitoes of North America during the winter is due in some way to the shorter period of daylight.

Eggs of *Aedes triseriatus* Say laid in the late summer would not hatch when placed in water in November though all contained fully developed larvae. Half the batch of dried eggs were then illuminated (xx)

c

artificially for six hours each evening for five weeks. On immersion in water great numbers then hatched, but very few of the unincubated controls. Equally striking results were obtained with wintering larvae of *Culisoides fitchii* Coq and *Anopheles barbasi* Coq. Those which were exposed in artificial tree-holes to a "16-hour day" began to grow and soon pupated. Larvae at the same temperature receiving only the normal amount of daylight showed no signs of growth.

From his experiments, which were very carefully controlled, the author concludes that the length of day is the dominant factor in initiating the rest period in the autumn and bringing about renewed growth in the spring in these larvae. I. B. Wigglehorn.

VAGOOR (E. H.) A Portable Stable Trap for capturing Mosquitoes.—*Bull. Entom. Res.* 1935 Sept. Vol. 26. Pt. 3 pp. 353-372. With 6 figs. (4 on 1 plate)

The stable trap as introduced into Jamaica for capturing adult mosquitoes, is a small screened building with openings which trap the mosquitoes that enter in search of the domestic animal confined inside. The animal used is a donkey, mule, calf or horse. This portable stable is made of galvanized iron sheeting and wire gauze panels, on a wooden framework. The roof and sides are separate members, which can be bolted together for use by means of wing-nuts. Scale drawing, plans and specifications are given. W F

GANGULI (A. C.) Observations on Malaria-carrying Mosquitoes of Calcutta.—*Records of the Malaria Survey of India* 1935. Sept. Vol. 5 No 3 pp. 213-222. With 2 maps & 2 charts. [11 mb]

An example of man-made malaria in a town.

The following are the only species transmitting malaria in Calcutta *A. stephensi*, *A. swadensis* and *A. vexans*. *A. stephensi* is the most prevalent. There is an enormous number of galvanized iron cisterns in Calcutta most of which contain unfiltered water for flushing privies. Others contain filtered water which the inhabitants have pumped up from the ground floor because the supply of filtered water is later nutrient and at low pressure. Larvae were found in about a quarter of 12,000 cisterns examined. In some houses water is stored in masonry cisterns on the ground floor and *A. stephensi* larvae were found in 16 per cent of these. *A. stephensi* is rarely found in the most backward areas of the city which are without a water supply, it is most common in that part which is provided with a water-carriage system of sewage disposal and a supply of unfiltered water for flushing. In those areas which are supplied with filtered water only and are without a water-carriage system it is much less prevalent. *A. swadensis* was found only in the eastern border of the city near Salt Lake. In almost all cases it was breeding in water which was only slightly saline. Most of the tanks in which it was found contained floating algae. It was most prevalent immediately after the rainy season. *A. vexans* was found in the south of the city breeding in large tanks with marginal vegetation. No larvae could be found in tanks which were kept clean. W F

PURI (I M) *Synoptic Tables for the Identification of the Full-grown Larvae of the Indian Anopheline Mosquitoes.*—*Health Bull No 16 Malaria Bureau No 7* 69 pp. With 81 figs. Second Edition. 1935 Delhi Manager of Publications. [As.4 or 5d]

In this edition the author has profited by experience of the errors of students during four years use of the Synoptic Tables at the Annual Malaria Class held at Karnal by the Malaria Survey of India and a number of alterations have been made. The subject matter of the pamphlet which is wider than the title would imply is dealt with under the following headings—Structure of the Larva Collecting and Rearing Mode of Examination of the Larvae Fixing Preserving and Mounting Identification of Larvae Simple Synoptic Table Advanced Synoptic Table Important Recent Synonyms of Indian Anophelines List of Indian Species with Breeding Places and Distribution. In the first of the two tables wherein brevity as well as simplicity has been studied, varieties are not included. With regard to the identification of larvae while attention is drawn to the occasional usefulness of a knowledge of the breeding habits and distribution of the various species the author rightly points out that "variations in the breeding habits are very common indeed."

It is only necessary to add that throughout Health Bulletin No 16 the explanatory figures are clearly drawn and that the work as a whole should prove useful to many in India besides those for whom it is primarily intended.

E E Austin

WEYER (Fr) *Die Variabilität der Grösse bei den Rassen von Anopheles maculipennis unter natürlichen Bedingungen und im Experiment. [Variability in Size in the Races of *Anopheles maculipennis* under Natural Conditions and in Experiments]*—*Arch f Schiffs u Trop Hyg* 1935 Oct. Vol. 39 No 10 pp 399-408. [14 refs.]

Among the earliest morphological characters used to distinguish races of *A. maculipennis* was in conjunction with the maxillary index the mean size of the females. The most convenient way of measuring size is to take the length of the wing and the author has already shown that the mean of this is not constant but is subject to marked variation during the same year and from one year to another. This applies especially to the race *atroparvus* which in North Germany was found to be slightly smaller than the race *messeae* the difference however being by no means so pronounced as stated by Dutch authors. Although generally of theoretical rather than of practical importance differences in size may nevertheless have a certain value when eggs are not available for comparison. Yet MARTINI and others have shown that external factors such as climate larval food colour of the bottom of the breeding place etc. are not without influence on the size of the adults which also varies inversely with the temperature of the water wherein the larval stage was passed.

On measuring adults of *atroparvus* and *messeae* from two localities in North Germany where both races occur considerable differences (e.g. 4.93 as compared with 5.29 mm.) in the mean length of the wings were found. But when in winter *atroparvus* females from two centres in East Friesland, where this race alone occurs were examined some of the mean wing lengths were actually in excess of those previously registered for *messeae*. As regards the influence of climate in a more

extensive area, a comparison of Danish and North German specimens of *strobatus* and *mezzesi* with representatives of the same races from Rumania and Italy showed that as the temperature rises the mean size diminishes, and vice versa. Experimental results (which, as pointed out by the author are for various reasons, less easily obtained than might be supposed) confirm, in the case of both races, the view that the mean size of the adult insects is subject to modification by external influences. Larvae hatched from the same batch of eggs produced larger imagines if allowed to develop at a lower temperature than that to which the water containing the remainder was exposed and batches of under-nourished larvae developed into imagines materially smaller than those bred from well-fed larvae. While differences in mean size occurring in nature in representatives of the same race are thus explained, the reason why in Germany at any rate, *mezzesi* has hitherto proved so remarkably constant in size is yet to seek.

E. E. A.

ROUAUD (E.) COLAS-BALLOU (J.) & TAILLARD (M.). Influence de la concentration en sel marin sur le développement larvaire d'*Anopheles maculipennis* (var. *strobatus*, *fallax* et *labranchiae*). [The Influence of the Concentration of Sea-Salt upon the Development of the Larvae of *A. maculipennis* (var. *strobatus*, *fallax* and *labranchiae*)].—Bull. Soc. Path. Exot. 1935. July 10. Vol. 18. No. 7 pp. 568-571.

Diluted salt water is more favourable than fresh water to the development of all 3 varieties.

These experiments were made by putting larvae, two days old, into varying dilutions of sea water and observing if they thrived and how long they took to pupate. The varieties of *A. maculipennis* employed were *strobatus* from the Vendée on the west Coast of France, *fallax* (*maculipennis*) from Normandy and *labranchiae* from Italy. The larvae of *strobatus* soon perished in concentrations varying between 9 parts of sea water to 1 of distilled water down to 3 parts of sea water to 7 of distilled water. The optimum concentration was about 1 to 5 which was equal to a concentration of 6.54 grams of NaCl per litre. At higher dilutions, and in pure water, there was a heavy mortality. Even the sweet water variety *fallax*, did not flourish in pure water. Here the optimum concentration was 4.31 gram of NaCl per litre. With *labranchiae* it lay between 3.43 and 0.88 gram per litre. In conclusion, it appears that a concentration of sea water ranging between 1/3 to 1/20 is more favourable than pure water to all varieties of *A. maculipennis*. It may be because of its influence either on the flora of the water or on the surface tension and osmotic pressure.

JF F

KRAAN (H.) DE BUCK (A.) & SWELLENBERGH (N. H.). On the Fat and Watercontent of Hibernating *Anopheles maculipennis* var. *strobatus* and var. *mezzesi* in Holland.—Rev. de Malariologie. Ser. I. 1935. Vol. 14. No. 3. pp. 201-213.

In Holland during September and October adults of both var. *mezzesi* and var. *strobatus* have what is known as "fat" in their adipose bodies, and in the case of *mezzesi* the bulkiness thus produced is so marked as to render this variety distinguishable at sight. In some years at least fat individuals may be found in equal number

among *messeae* and *atroparvus* but in October 'fat' *messeae* contain more fat and water than 'fat' *atroparvus*. During winter adults of both varieties suffer emaciation but whereas in *messeae* this takes place slowly and is really a matter of dehydration because the loss of fat is slight compared with the loss of water it involves individuals of *atroparvus* which feed at intervals during hibernation grow lean quickly as the result of losing equal proportions of fat and water. With the termination of hibernation in the latter half of February females of *atroparvus* except for a certain disturbance in the water fat balance are much as they were in the previous autumn and are quickly recovering from the deterioration in physical condition caused by their partial winter fast. On the other hand "Unlike *atroparvus* lean *messeae* have not yet commenced to repair the losses sustained during the complete manition lasting over the whole of the 6 months of hibernation. As a consequence they have now really turned lean the loss of fat being greatly in excess of the loss of water.

E E A

MISIROLI (A.) Nuova varietà di *Anopheles maculipennis* [New Variety of *A. maculipennis*]—Ann d'Igiene 1935 May Vol. 45 No 5 p 333

Professor Misiroli has recently been studying the Anophelines met with on the margins of Pergusa Lake, which is 870 metres above sea level in the Province of Enna, Central Sicily. Of 165 oviposits from *A. maculipennis* captured near the lake 162 were of *A. maculipennis labranchiae* and 3 of a variety not previously described and which he has named *A. maculipennis pergusiae*. The eggs are broader than those of *labranchiae* and somewhat shorter of a uniform grey colour with a marked frill and striated air cells like those of *labranchiae* but so small as to be seen only with difficulty and they bear considerable resemblance to those of *A. mac. claviger*. Examination of the male hypopygium and the morphological and biological characters of adults which we shall obtain by breeding will enable us to determine the characteristics of the new variety with greater precision. The present communication is merely a preliminary note H H S

WALCH (E. W.) & WALCH SORGDRAGER (G. B.) De eieren van eenige Anophelen in Ned. Indie. [The Eggs of Certain Species of Anopheles in Netherlands Indies.]—Geneesk Tijdschr v Nederl-Indië 1935 Oct. 1 Vol. 75 No 20 pp 1700-1730 With 76 figs. on 6 plates (4 folding) [21 refs.] English summary

The authors summary is as follows—

1 This article contains a description of the eggs of 15 species of Anopheles, of which those of *A. alboannulatus umbrosus punctulatus* and *leucospilurus* were till now not yet known. Those new species we obtained from Borneo and New Guinea in paper with formaline. The eggs of *A. hyrcanus* var *sin* from Nanking (also preserved in paper with formaline) were described.

2 There were observed some differences in the situation number and form of the bosses of some species especially those of the subgenus *Neomyzomyia* were clearly distinct from other kinds and those of *A. maculatus* were also more or less characteristic.

3 Some differences were observed in the number situation and form of the corrugations of chorion on the floats between some

sub-genera, viz., *Anopheles*, *Neomyzomyia* and *Paedomyzomyia* (as far as we know them).

" 4. The micropyle on the other hand seemed in all species to be built in the same way.

5. The eggs of *tessellatus* and *kochi* that were until now supposed to be identical, could be distinguished from each other i.e., by the different breadth of the dorsal surface and of the frill.

" 6. The eggs of *A. annulans philippinus* about whose identity there existed some doubt, were described and proved to be the same as one of the batches described by CHAUSTOMERS and BARKARD.

7. Eggs of *A. fuscipes* were obtained from Sumatra (fresh water) and from Batavia and Surabaja (salt water). The fresh water eggs showed some differences in length and number of ribs as compared with the salt water eggs (all taken together) but these differences were much smaller or non-existent between the fresh water eggs and the salt water eggs from Surabaja only the latter being longer and having more ribs than those from Batavia.

The pattern of the exochorion was the same in all eggs.

8. The eggs from *A. subpictus* from different places and especially from fresh and salt water showed big differences, consisting mainly in the pattern of the dorsal surface the breadth of the frill and the number of ribs.

" To know for certain if we have to do with different races it will be necessary i.e. to breed them in more generations in order to test if these properties are hereditary.

9. The eggs of most species described here were the same as those from British India described by CHAUSTOMERS and BARKARD, but some showed differences, viz. —

" a. *Annullans philippinus*.—The eggs here were smaller showed a distinct double curve of the outline of the dorsal surface near the float terminations, not described by CHAUSTOMERS and BARKARD, and also practically not indicated in their drawing and on the dorsal surface in most specimens of all the batches there could be seen a tigerlike pattern.

b. *Yunnanensis*.—It is possible that the frill of the eggs in this country is smaller than that in British India. At any rate it does not pass over the floats. And furthermore there is here a little distance between float and frill not existing in British India.

" c. *Subpictus*.—There was a big difference in the size of this egg compared with that from Bengal, where it is much larger (resp. 48 and 680 μ) The number of ribs was here much smaller resp. 21 against 30-40 over there. The frill seemed somewhat different in structure. At any rate it was not slightly opaque or milky here, nor stiff and thick, but clear and fine.

" As between the *A. subpictus* from British India and the one from this country there exists also a biological difference viz., that the one from British India does not carry malaria in nature while in this country it does, it is suggested that we may have to do here with a race (races) different from that in Bengal.

Pocon (Igino). La colorazione vitale delle uova di *Anopheles maculipennis* nella differenziazione delle singole varietà. Arch. Ital. Sci. Med. Coloni. 1933. Oct. Vol. 18. No. 10. pp. 722-728. With 3 figs. (3 coloured on 1 plate).

MONIER (H) & TREILLARD (M) *Anopheles (Myzomyia) funestus* var *imerinensis* var n. de Madagascar [*Anopheles (Myzomyia) funestus* var *imerinensis* a New Variety in Madagascar]—Bull Soc Path Exot 1935 July 10 Vol 28 No 7 pp 572-573

The authors describe an anophelino captured in large numbers at Antananarivo they regard it as a new variety of *A. funestus* and have named it *imerinensis* W F

SIMPSON (George) & ANDERSON (Archie S) Quinine Amaurosis—Med Jl Australia 1935 Aug 31 22nd Year Vol 2 No 9 pp 290-291

A case of complete but transient blindness.

A woman 36 years of age took about 50 grains of quinine with the object of terminating an unwanted pregnancy. She awoke next morning completely blind, but without tinnitus or any other sign of quinine poisoning. At 10 a.m. she was unable to distinguish light from darkness and her pupils were widely dilated and fixed. Two and a half hours later she could see a little and by the next morning her vision appeared quite normal. No changes were found in her fundi then or at a detailed examination made 18 days later. In many of the reported cases a permanent constriction of the visual fields resulted but in this instance there was none. In some cases constriction of the retinal vessels occurs in others as in this case the fundus is normal and on these grounds it has been suggested that the quinine acts directly on the visual nerve elements. W F

Prescriber 1935 Sept. Vol 29 No 9 pp 271-284 [48 refs.]—
Malaria Abstract Reviews of Current Literature. [Therapeutic Progress.]

COPELAND (A. J.) Malaria and Racial Extinction. [Correspondence]—
Lancet Sept. 21 pp 691-692.

LEPROSY

LEPROSY REVIEW 1935. Oct Vol 6 No 4 pp. 149-157
 With 8 figs. on 2 plates.—Quarterly Publication of the British
 Empire Leprosy Relief Association, 131 Baker Street, London
 W 1 2s

An account of the Leprosy Institutions of Nigeria by H. C. Anderson. It is the largest settlement, under Dr Macdonald with 1,600 inmates, each member of which has to do five hours work on farms or the settlement industries for each infection he receives. The majority of the houses are also built by them. Goats supply milk, a liberal amount of which helps treatment. Road making, etc. provides work for all capable of it. A school for 150 children and night educational classes are provided, together with a Scout and Girl Guide movement, various games and a brass band. A church of Scotland to hold 1,300 has been built at a cost of £130. Babies born in the settlement are removed at once to a clean babies home where their mothers go to suckle them with careful precautions to limit contact as much as possible. Treatment is carried out twice a week.

Another settlement at Ibadan with nearly 400 inmates, is supported from local administrative funds and provided with a medical officer by the Primitive Methodists at a total cost of £4 a head per annum, for most of their food is grown on their own farm. Weekly injections are given. A new settlement has just been completed by the Nigerian Government at Oshimo for 400 patients under the charge of a medical officer and a European sanitary inspector with public works expenditure. It is considered to be important to attract earlier cases to the colonies, as too many of the admissions are patients in an advanced stage who have been driven out of their villages, and will already have infected others.

Leprosy in South America is dealt with by W. E. Brownrigg. The first Leprosarium in the New World is believed to have been founded near the beginning of the seventeenth century at Cartagena in Colombia. The following data regarding the present incidence of leprosy in South America are given.

Venezuela. Population 3,000,000 cases several thousand. A few hundred in two official leprosaria.

Colombia. Population 6,000,000. Probably about 30,000 cases. Over 4,000 in three leprosaria, but little expert treatment provided.

Ecuador. Population 2,000,000. Possibly several thousand cases but no data. One small leprosarium.

Peru and Bolivia. Little leprosy mostly in warmer Amazon basin.

Chile. Malaria free from leprosy. Small colony on Pacific Easter Island.

Argentina. Population 12,000,000. Estimates of cases vary from 4,000 to 10,000. Census revealed 2,300 with only 250 in institutions. Most in warmer northern provinces.

Uruguay. Population 1,500,000. Recent estimate of over 500 cases. Under care 40.

Paraguay. Population 900,000. Cases 4,000 to 10,000. Leprosarium of c. 500 acres provided and under construction.

Brazil. Population 45,000,000. Cases not under 30,000. Many leprosaria.

The author thinks a total estimate of 100,000 lepers in South America is as exact as possible at the present time.

The vexed question of relapses in leprosy is considered mainly from a theoretical point of view by G. R. RAO in the next paper. He suggests that the term "disease arrested with deformities" should be substituted for "burnt out cases". He records four cases in which amputation of a septic foot in advanced quiescent nerve cases was followed by a recrudescence of the disease and he gives a table of 20 relapses 16 of which were neural cases. He thinks it probable that an unrecognized non acid fast neurotrophic virus form of *M. leprae* exists.

D. P. DOW and J. S. NARAYAN suggest that gonorrhoeal arthritis may easily be mistaken for lepra reaction by lowering resistance.

E. S. R. ALFRED advocates giving fluorescein injections during intervals in the use of ethyl esters with a view to lessening the frequency and duration of lepra reactions after prolonged use of esters.

L. Rogers

LEPROSY REVIEW 1936 Jan Vol. 7 No. 1 pp 1-50 With 6 figs. (4 on 2 plates) — Quarterly Publication of the British Empire Leprosy Relief Association 131 Baker Street London W.I. [2s.]

This is the first issue of this publication to be edited by Dr E. MUIR now Secretary of the British Empire Leprosy Relief Association. The following are the principal original articles in it. The Editor discusses the probable number of lepers in the world and concludes that they may be placed at two to four millions the larger figure including early not easily recognizable cases. He points out that while clinics for out-patient treatment are suitable for such densely populated countries as India and China in the more backward tropical African countries the colony system is the best.

Bacillaemia in leprosy is discussed by H. V. R. MOSTERT who found they could be demonstrated in thick blood films more easily with Munch's modification of the Gram method than with the Ziehl Neelsen method. He found them in all of five cases during an acute exacerbation and as a rule only in nodular cases while the method is of no practical value in diagnosis as the bacilli are much more easily demonstrated in the skin. In 48 per cent of the positive cases the Wassermann reaction was also positive. They are most often found in the large mononuclear cells and their presence in the blood is a very unfavourable sign.

F. G. ROSE records a brief reply to the critics of his paper on the Curability of Leprosy and points out the errors some of them have fallen into. His twenty years experience of work on leprosy leaves him in no doubt regarding the great benefits of the modern treatment.

A note on anti-leprosy work in the Punjab by S. S. JAIKARA is of local interest only. The remaining articles are extracts from other journals and newspaper cuttings.

L. R.

LEPROSY IN INDIA 1935 Oct. Vol. 7 No. 4 pp 147-191 With 5 plates & 9 figs. — Issued quarterly by the Indian Council of the British Empire Leprosy Relief Association.

J. RODRIGUES describes under the old term "lazarine leprosy" cases characterized by the formation of blisters in the absence of burns or

rubbing, the fluid of which contains numerous acid-fast bacilli, and which tend to go on to deep sloughing ulceration, but without the usual signs of acute leprosy reaction. Photos of the late stages are given.

D. P. DOW advocates the use of massage, electricity and diathermy in the treatment of the contractures of leprosy and he describes and illustrates three cases with improvement in the condition of the hands.

E. B. CHRISTIAN records a study of family transmission of leprosy as seen at the Dichpali Leprosy Hospital, with a view to ascertaining if bacteriologically negative, as well as positive cases can transmit the disease. A table gives the data of 57 families to show that in only 13 were both parents infected, in most of which there was a previous history of leprosy in both families, so conjugal infections were rare. Further in 11 families with one neural, non-infectious parent none of the 23 children showed any sign of leprosy but of 110 children with one or both parents an infectious cutaneous case of leprosy no less than 101, or over 90 per cent, showed definite signs of the disease. Further the older the child when first exposed to infection the less likely is he to contract the disease. The two sexes suffered equally among the children. Infectious leper servants may also infect children. L. R.

*Arquivos da Escola Médico-Cirúrgica de Nova Goa. Ser. A.
1935. No. 6. pp. 1391-1554. With 7 plates. A campanha
antileprosa na Índia Portuguesa. [The Anti-Leprosy Campaign
in Portuguese India.]*

[Matter of general interest in this long report is very limited. Four fifths are taken up with subscription lists and accounts of the opening and other ceremonies connected therewith nearly 9 years ago, even to the extent of giving details of the musical programs on tea occasions.]

The Central Leprosarium, Goa, was opened in May 1932 with 12 patients. In a table is given an analysis by age and sex of 107 examined in 1934. Sixty-six were males, 41 females. 41 of the former and 31 of the latter were between 21 and 45 years of age; there were none under 5 years and only 3 (all males) under 10 years of age. In a later chapter brief notes are given of 109 patients admitted between 17th May 1932 and the end of 1934. The subject of treatment is disposed of in a brief chapter of 5 pages, and the actual methods employed in 2 pages. The following have been tried —

(1) Injection of cultures of Friedmann's bacillus and application by imunction, in 4 cases. No result was obtained.

(2) Antimonials, Sdt. 388 and Sdt. 396 B 6 were found to set up phlebitis. Stibenyl brought about slow cicatrization of ulcers. Better results were obtained from intravenous injection of 1 per cent. mercurochrome.

(3) Methylene blue has proved disappointing, but the "moral" effect of the coloration of the nodules is good in making the patients think that cure is beginning.

(4) Chaulmoogra and its derivatives have proved of most service.

At present the plan followed is in the first place hygienic régime—good food, baths, rest, tonics, treatment of concomitant diseases such as malaria, dysentery etc.—and dressing of ulcers. After 2-3 months of such preliminary measures specific remedies are started, as weekly intravenous injections of mercurochrome 1 per cent., 0.5 cc. rising by the same to 4 cc. for ulcers; selenol intravenously 1 cc. increasing to

5 cc. of 1 per cent. solution chaulmoogra oil or ethyl esters etc. the latter intramuscularly the former in capsules with tablets of alepol in the intervals.

H H S

SAINTE MARIE (P. E. Flye) La lépre au Maroc. Revue générale [Leprosy in Morocco.]—*Internat Jl Leprosy* Manila. 1935 July-Sept. Vol. 3. No 3 pp 315-326 With 1 map [26 refs.]

After reference to previous inquiries in Morocco the author is able to add 190 cases he had observed to bring the total in North Morocco up to 330. No part of the country is free, but the two main foci are in the North and among the Doukkala tribe in the South with some 300 cases so the total is about 600. In the capital of Fez there are a number of pilgrim lepers. There is no restraint on their movements and it is advised that they should be isolated under favourable conditions (but not imprisoned) preferably in agricultural colonies with treatment, and that the children should be from birth isolated in a special home.

L. R

GRAHAM YOOLL (M. A.) Notes on the Leper Colony at Berhala, Sandakan, North Borneo—*Jl Roy Nav Med Serv* 1935 Oct. Vol 21 No 4 pp 334-342. With 5 figs.

The author visited, with the principal Medical Officer the North Borneo Leper Settlement on the island of Berhala close to Sandakan. During the last five years the cases have increased from 53 to 72 mostly Chinese. A brief account is given of the usual types of the disease and the patients are treated by injections of Muir's creosoted hydnocarpus oil and by alepol at weekly very welcome visits of the medical officer. The prognosis is naturally better in the early cases.

L. R

STRACHAN (P. D.) The Effect of Compulsory Segregation of Lepers in Basutoland.—*South African Med Jl* 1935 Aug 24 Vol 9 No 16 pp 554-555

In 1895 Dr Long found not more than 200 leprosy cases in Basutoland, but when the leper asylum was opened in 1914 strenuous efforts of the chiefs resulted in 600 being admitted. In the mountainous Qacha's Nek district the incidence is twice as high as in the more agricultural western areas and the cases are more difficult to isolate. The improvement in economic conditions tends to decrease leprosy but the administration efforts are counterbalanced by over population. It is argued that on the law of compound interest it is highly probable that in the period of 19 years the number of leprosy patients in the territory was trebled. Advanced cases are now rarely seen outside the asylum, and it is estimated that at the end of 1934 there could not be over 300 early cases outside although apparently no surveys have been made and it is argued that the 600 badly infected cases would in the 21 years to date have increased to 2,020 or more than double the present estimated numbers and of a worse type. The conclusion is come to that although The cost of the Asylum has been a terrible drain on the resources of the territory an extension of the present more successful inspectorate system of finding cases in the form of general health visitors would eradicate leprosy sooner than any other system.

L. R.

CARTON: Etude sur la lèpre dans la circonscription de Dschang (Cameroun) Bamouns et Bamilekés [Leprosy Incidence in Dschang (Cameroons)]—*Ann de Med et de Pharm. Colon.* 1933 Jan.-Feb.-Mar Vol. 33 No. 1 pp. 5-24

The author found in the Dschang district 1 per cent. of 450,000 people infected, and 600 are isolated. In Grausfeld there are at least 3,000, 1,500 being severe cases.

L. R.

VOLASCO (J. O.) The Leprosy Problem in the Philippines and Leprosy in Norway.—*Jl. Philippine Islands Med. Assoc.* 1935 July Vol. 15. No. 7 pp. 349-357

The heavy cost of leprosy segregation in the Philippines has led the newly constituted Philippines Legislative Council to pass an Act supposed to be patterned after the Norwegian system, but disapproved by the Governor-General. The author therefore draws attention to the great advantages Norway had of 77 years trial of isolation with home segregation not suitable to the Philippines, and about one-tenth the number of lepers, not living in a number of islands as in the Philippines, for these great differences make a fair comparison impossible. The Philippine plan has at least removed advanced cases from the towns, and now many admissions are voluntary for the sake of treatment in early stages, as compared with those isolated in the earlier years of the tests, and the larger numbers lately are no evidence of any increase of the disease, which at least appears to have been checked. Moreover the recent modifications of starting treatment centres and skin dispensaries for treatment of the earlier cases together with the release of segregated ones which have become uninfective, has removed most of the objections of the people to the present measures, which deserve to be continued to give them a fair trial. Unfortunately two of the new treatment centres have been closed on grounds of economy.

L. R.

AUSTIN (C. J.) The Problem of Leprosy in Fiji.—*Native Med. Practitioner Socia.* 1935 Sept. Vol. 2 No. 3 pp. 290-292

The author had previously stressed the importance of early diagnosis in relation to prognosis and the eradication of leprosy to allow of treatment in time to prevent the patient becoming infective to others. The want of this is shown by the number of advanced cases sent to the Makogal settlement. The native medical practitioners should also examine all contacts periodically for at least five years to detect and treat early cases, as well as discharged cases to find relapses. If these measures were regularly carried out "leprosy in Fiji will soon become a disease of the past."

L. R.

YU (K. Y.) Indigenous Cases of Leprosy in Manchuria. Report of 4 Cases.—*Chinese Med. Jl.* 1935 July Vol. 49 No. 7 pp. 644-651 With 4 figs. on 1 plate & 1 map.

An earlier partial survey had failed to find a single indigenous case of leprosy in Manchuria, but four such cases are now reported among 23 new ones.

L. R.

DOSTROWSKY (A) The Control of Leprosy in Palestine.—*Harefuah*
Jerusalem 1935 Sept.-Oct. Vol. 9 No 5 (53) [In Hebrew
English summary pp 6-7]

This brief note records that from the establishment of the Lepers home in Palestine in 1896 up to 1927 261 cases were treated but 33 more were seen up to 1933 over 50 per cent residing in Jerusalem Of 26 Orientals 19 were born in Palestine Chaulmoogra derivatives treatment is used and isolation is considered imperative and the disease is curable in the early stages. Examination of all the villagers where a leper is found is recommended.

L R

WELCH (T B.) The State and Lepers in Malaya.—*East African Med Jl*
1935 Feb Vol. 11 No 11 pp 353-356

BURNET (Et.) Un centre international d'étude de la lèpre. [An International Centre for the Study of Leprosy]—*Bull Acad Med*
1935 Dec. 24 89th Year 3rd Ser Vol. 114 No 42
pp 848-850

This brief paper announces the formation of the first centre for the scientific study of the leprosy problem in South America at Rio de Janeiro with the help of the League of Nations under the charge of the dermatologist, Dr Ed. RABELLO who has studied the serology of leprosy. The co-operation of the Oswaldo Cruz Medical Research Institute, and of the well organized leprosy isolation institutions of the S. Paulo State with 5 000 cases in colonies in which all the known infectious cases are under care has been obtained.

L R

TORRENTINO (Jose G) Sex Susceptibility in Leprosy—*Jl Philippines Islands Med Assoc* 1935 July Vol. 15 No 7 pp 374-377

The author records his experience on this point at the Cebu treatment centre. For this purpose he made a survey of the incidence of the disease in 594 families in 40 of which one or both parents were the source of infection. Of 132 sons 37 or 28.03 per cent and of 119 daughters 21 or 17.65 per cent became infected, so he agrees with Y Hayashi (with 45 per cent. of sons and 32 per cent of daughters) that males are more susceptible than females all ages being included. He agrees that among children the sex incidence is equal and he suggests that in adults the sex hormones in females directly or indirectly render them relatively more resistant to infection than the males. He also thinks the demand of the system during puberty for iodine accounts for the frequent development of lesions at that time.

L R

MOSER (B) Tuberculoid Leprosy in Southern Rhodesia.—*Internat Jl Leprosy* Manila 1935 July-Sept. Vol. 3 No 3 pp 279-282 With 3 figs. on 1 plate.

Since the visit of H. W Wade in 1931 when one case of tuberculoid leprosy was found among 300 inmates the author has met with only 6 out of about 700 patients so the condition is rare in S Rhodesia while he had never noted such a case when previously working at leprosy in Nigeria. He notes a peculiar purplish colour of the lesions in

some of his patients which, together with the raised edges, enables cases to be easily recognized. He agrees that acid-fast bacilli are rarely present and the cases yield readily to treatment by intramuscular injections of iodized ester.

L. R.

SCHUJMAN (Salomon) "Lepra tuberculoides." Contribución a un estudio clínico e histopatológico. [Tuberculoid Leprosy. A Clinical and Histological Study]—*Prensa Méd. Argentina*, 1935, Dec. 4, 11, 18 & 25, Vol. 22, Nos. 49-50, 51 & 52, pp. 2347-2385, 2406-2424, 2465-2476, 2504-2518. With 71 figs. [15 refs.]

This long article does not permit of useful abstraction. It is concerned with the histories, clinical characters and general details of 21 cases of leprosy presenting tuberculoid lesions. The question of differential diagnosis from lupus, psoriasis, Hansen syphilis and other conditions is briefly discussed. The article is embellished with photographs and photomicrographs—the majority of these are well reproduced and very clear demonstrating the clinical states of the patients, the macroscopic appearance of the lesions and the histological changes shown in sections obtained of tissue taken by biopsy.

The author shows that these cutaneous lesions are accompanied or characterized by altered sensibility often resemble those of lupus and are very frequently bacteriologically negative [in so far as the bacilli are difficult of demonstration, they are present but are very few and sparse]. Clinically the prominent, infiltrated margins of the lesion with altered sensation are highly characteristic, the centre being flat, atrophic or slightly achromatic. The epidermis is often thin and sometimes atrophic, but the basal layers are infiltrated and the upper layers invaded by the infiltration. Commonly the infiltration is around the hair follicles or sebaceous and sweat glands and there is perivascular infiltration with swelling and proliferation of the vascular endothelium. In some cases the lesions appear to be a transitional stage to the formation of lepromata. Further investigation to determine whether this is so is to be undertaken.

H H S.

DUBOIS (A.) COCHRANE (R. G.) RODRIGUEZ (José) FRASER (N. D.) The Abortive Case. [Correspondence and Comments]—*Journal of Leprosy*, Manila, 1935, July-Sept., Vol. 3, No. 3, pp. 357-360.

Dubois raises the question of how to deal with patients presenting a single small leprous looking macule which remains stationary for years, and considers they should be watched without treatment. Cochrane agrees, but Rodriguez questions the diagnosis in some such cases, and Fraser considers that it is not justifiable to withhold treatment, as some of them may be early leprosy which would develop if left alone.

L. R.

DUS ESSARTS (J. Quérangal) & LEROUX (G.) Les sarcoides de la lépre. [Sarcoid Lesions in Leprosy]—*Bull. Soc. Path. Exot.* 1935, July 10, Vol. 28, No. 7, pp. 628-639. [17 refs.]

The authors describe under this term lesions showing the structure of tuberculoid leprosy with epithelioid and a few giant cells without caseous changes, but in which the lesions may have advanced to a

papular or nodular stage. Notes of eleven cases are given and the histological changes described in detail, in six of them in the macular stage no leprosy bacilli were found, but they were present in small numbers usually in the five papular cases. The differential diagnosis is discussed and the condition is considered to be a peculiar tissue reaction to Hansen's infection

L R

CHIYUTO (Sulpicio) Early Lepromatous Changes in Children and their Bearing on the Transmission and Evolution of the Disease III.—*Monthly Bull. Bureau of Health Manila* 1935 July Vol. 15 No 7 pp 217-234 With 1 chart. [16 refs.]

The author adds 42 new cases to the 40 he previously reported showing lesions which he regards as very early bacteriologically negative signs of commencing leprosy with a view to a study of the evolution of the disease and their bearing on transmission. In the case of the multiple hazy depigmented macules in 71.9 per cent. they became more visible in 46.3 per cent. the border became slightly thickened but in only 7.3 per cent. advanced to typically infiltrated pinkish macules while in 8.5 per cent. tuberculoid zones were noted. Papulo-vesicular eruptions were confirmed as lepromatous in 47.6 per cent. Minute pale follicular papules were interpreted as lepromatous in 15.6 per cent. Superficial neurological changes although not the first sign were the first alarming symptoms in 57.8 per cent. His work supports the theory of infantile infection and adult immunity

L R

RODRIGUEZ (Jose) Relapse of Leprosy under Controlled Conditions.—*Internat Jl Leprosy Manila* 1935 July-Sept Vol 3 No 3 pp 333-338

This brief report records that four out of five negative paroled leprosy patients living under good conditions with antileprosy treatment relapsed after from 4 months to 3 years.

L R

VEERASINGHAM (K. V) & RASANAYAGAM (S) Preliminary Observations on the Problem of Early Leprosy among Immigrants.—*Malayan Med Jl* 1935 June Vol. 10 No 2 pp 51-52.

At the Malayan Pulau Jerejak leper settlement 92 per cent. of the inmates are of foreign birth with 783 Chinese and 142 Indians while 67 Chinese and 12 Indians were local born. During 1934 about 3,000 cases were treated at local institutions and it is believed that the numbers are increasing chiefly due to increased intake. Eurasians numbered 20 and Malay races 133. Late in 1934 a special examination was made at the Pulau Jerejak quarantine station for early leprosy among immigrants from S. India and 67 cases 0.78 per cent. were detected among 8,537 adults, 65 of whom were early neural or maculointerstitial, and only 2 of the cutaneous type. They were all repatriated at the expense of the agents.

L R

MUIR (E) & CHATTERJI (S N) Bernhardt's Syndrome.—*Indian Med Gaz* 1935 Apr Vol. 70 No 4 pp 192-193 With 1 text fig

A brief paper pointing out that an anaesthetic area in the upper outer thigh distribution of the lateral cutaneous nerve described by BERNHARDT as due to constriction of the nerve by fibrosis of the muscle it passes through or to syphilis, gonorrhoea or septic conditions may

be mistaken for leprosy but the absence of any other leprosy lesions will exclude that disease. Brief notes of 12 such cases are given.

L. R.

RIBEIRO (Leonídio) Um caso de lepra descoberto pela dactyloscopia. [Leprosy discovered through Dactyloscopy]—*Folha M. d. 1935 Oct 25 Vol. 16 No. 30 pp. 489-492 With 5 figs.*

Detection of crime or discovery of criminals by finger-print identification is a matter of universal knowledge—the case here recorded is, as it were, a corollary of this—discovery of leprosy infection by alteration in finger print. The subject was a woman who went as servant to Professor DA FOIXECA in 1919 at the age of 16 years. Being unable to write she signed certain papers for the bank with her right thumb impression. In August 1935 i.e. 16 years later, wishing to take out some of the deposited papers, she was called upon to prove her identity by the thumb impression. A comparison was made but was not satisfactory and she was in danger of prosecution for attempted fraud. She was taken to Professor DA FOIXECA for identification, who examined first the thumb-prints and then the patient and the diagnosis of leprosy was next day confirmed by Professor RABELLO.

H H S

VESOU (Miguel) Envio de patologia da lepra superinfecção. [Superinfection in Leprosy]—*Rer. Leprologie do S. Paulo 1935 Sept Vol. 2 No. 3 pp. 173-184.*

The author gives details of three cases of leprosy all primarily of the nervous type, in whom after intervals of some years, 5 or more, other symptoms, of the nodular form, developed. The author concludes—

1. It is undeniable that superinfection occurs in leprosy as in other infections.

2. Endogenous re-infection (superinfection) plays a large part in the evolution of leprosy.

3. Superinfection, as a factor in transforming latent into manifest disease or of converting a quiescent case into one excreting bacilli, must not be underrated when we consider prophylactic measures.

H H S

ESSER (P. H.) Psychose bij lepra. [Psychoses in Leprosy]—*J. der Psychiatrie & Geisteskr. 1935 Nov 30 Vol. 79 No. 48 pp. 553-5559. French summary (2 lines).*

The psychoses which have been described as occurring in leprosy are (1) the psychogenic psychoses (2) the exogenous symptomatic (toxic) psychoses (3) the remaining psychoses. To the first group belong the psychogenic depressions, the psychogenic paranoid psychoses, "imprisonment psychoses," etc. The second group comprises the psychosis of KOREAKOFF in leprosy polyneuritis, leprosy neuroathenia, the mental deficiency pictures and the toxic and cachectic deliria in the terminal stages of the disease. The third group is the largest and is a group in which the leprosy is merely incidental, for example the occurrence of leprosy in schizophrenia. Some observers have maintained that there is a fourth group—the organic, due to destructive leprosy lesions in the brain.

An illustrative case is cited of a young man with unsatisfactory upbringing and a drunken father who left Holland at an early age.

to serve in India led a dissolute life there and contracted leprosy. The disease was discovered after his return to Holland where mental symptoms soon made their appearance. His case is describable as one of paranoid psychogenic reactive psychosis in conjunction with mixed leprosy. There was no evidence of his condition being due to a leprotic lesion in the brain.

W F Harvey

KREU (Ernst) *Lapua erythematodes discoides bei einem Leprösen*—
Arch f Dermat u Syph 1935 Sept. 20 Vol. 173 No 1
pp 34-36 With 2 figs.

TUAROU (J) & BERRY (P) *Un enfant de 1 an fils de lépreuse, porteur d'un nodule contenant des bacilles de Hansen*.—*Bull Soc Path Exot* 1935 July 10 Vol. 28 No. 7 pp 549-550

WALKER (Ernest Linwood) & SWEENEY (Marion A.) *Embryonic and Tumor Tissues as Culture Media for the Microorganism of Rat Leprosy*.—*Amer Jl Trop Med* 1935 Sept. Vol. 15 No 5 pp 507-513 [12 refs.]

After references to the work of others the authors describe their own results as follows. No multiplication of rat leprosy bacilli was obtained in minced embryonic tissues suspended in Tyrode solution. A pleomorphic acid fast organism identical with those they had obtained from human and rat leprosy did grow in those media but better in a leaner medium than the minced embryo one. They suggest that the results claimed by others of cultures of lepra bacilli in these media were due to serial transfers of the abundant organisms or to acid-fast organisms appearing in the cultures as contaminants.

L R

COWDRY (E V) & HENBURGER (L F) *Morphology of Bacillus of Rat Leprosy*.—*Proc Soc Experim Biol & Med* 1935 June Vol. 32 No 9 pp 1422-1423.

On staining by Gerah's Ziehl-Neelsen method involving the instantaneous freezing of the tissue by plunging into liquid air and dehydration *in vacuo* while still frozen the author found that the acid fast bacilli of both leprosy and tubercle showed smoother outlines and much less granular appearance. This would appear to be their normal condition.

L R

KIKUTH (W) & VERFÜRTH (D H) *Ueber den heutigen Stand der Leprabazillenzüchtung [Present Position of Cultivations of Mycobacterium leprae]*.—*Deut Med Woch* 1935 Sept. 6 Vol. 61 No 36 pp 1435-1438.

This is a review of literature on attempts to cultivate the leprosy bacillus, which contains nothing new

L R

STEVENEL (L) & BERRY (P) *Un procédé de biopsie cutanée chez les lépreux [Obtaining Fragments of Skin for Examination for Leprosy]*.—*Bull Soc Path Exot* 1935 July 10 Vol. 28 No 7 pp 547-548.

A simple method of obtaining a small fragment of lepromatous tissue for ~~the~~ ioning without much inconvenience or fright to the patient is described. A needle is inserted into the superficial layer of the

D

the skin parallel with the surface and the point made to emerge one or two millimetres from the point of entrance. A thin portion of the skin is thus raised and a slice removed by a razor following the direction of the needle as closely as possible. The insignificant wound is covered with collodion and cotton wool.

L. R.

SABIN (F. R.) SUMMERSOR (K. C.) & THOMAS (R. M.). Cellular Reactions to Waxes from *Mycobacterium leprae*.—*Jl. Experim. Med.* 1935 Dec. 1 Vol. 62 No. 6 pp. 771-786. With 4 figs on 1 plate.

This technical paper describes the cellular reactions to the intra-peritoneal injection into rabbits of five preparations of the waxy substances separated from cultures of an acid-fast strain of *Mycobacterium leprae* isolated from a case of leprosy. The authors conclude that, like the waxes of the tubercle bacilli, those now tested are remarkable stimulants to cells. The crude wax is a mixture of lipoids and other materials and gives reactions similar to the response to the tuberculo-poly saccharide, phosphatide and wax as does the wax obtained from purification of the lepros-phosphatide but with more giant cells. Leprosin, though a glycende, corresponds to the unsaponifiable material from the tubercle bacillus. It stimulates both fibroblasts and monocytes and the latter fuse into foreign body giant cells to engulf the wax. The cellular reaction to the leprosinic acid and to the crystalline alcohols is one of the foreign body giant cell. L. R.

ANDERSON (Hamilton H.) & ANDERSON (Jeanette van D.). Iodine Values and Total Lipids of Leprous Human Blood Serum.—*Proc. Soc. Experim. Biol. & Med.* 1935 June Vol. 52 No. 6 pp. 1470-1473.

The authors have determined the iodine values and serum lipids of leprosy patients receiving chaulmoogra therapy with the following results—

Average Iodine Values and Total Lipids of Blood Serum of 83 Patients under Treatment for
"Calotancreus" (Mixed) Leprosy at Pale Skin Leprosy Colony, Peshawar

Stage and Course of Disease.	$\frac{1}{2}$	Iodine Value	Total Lipid Content						
Early Predominantly Cutaneous Leprosy†	18	30.1	57.2	12.18	4.1	1.44	80.1 ± 13.8	0.885 ± 0.117	
All Stages—Improving‡	13	30.4	59.9	11.85	6.3	1.57	84.5 ± 18.1	0.813 ± 0.147	
Advanced—stationary	11	31.9	58.2	11.02	9.4	2.25	86.9 ± 14.1	0.728 ± 0.122	
All stages—advancing	11	33.1	58.7	12.87	9.6	2.74	77.8 ± 19.3	0.573 ± 0.144	

Normal values. Total lipids, 0.589 Gm./100 cc. Iodine value of total fatty acids, 80. (P. B. E. M., J. Experim. Med. 1933 101 323.)

Average values for 83 leprosy patients. Total lipids, 0.805 ± 0.161 Gm./100 cc. Iodine value, 88.5 ± 15.0 .

†Three patients untreated. Iodine value 31.2 total lipids, 1.018 Gm./100 cc.

‡One patient with leprosy fever. Iodine value 31.2 total lipids, 1.018 Gm./100 cc.

Advanced treated cases showed greater unsaturation of the blood fatty-acids and lower total lipids but the findings are masked by the large amounts of chaulmoogra administered.

L R.

SPINDLER (A.) *The Pathogenesis of Leprosy*—*Internat Jl Leprosy*
Manila. 1935 July-Sept Vol 3 No 3 pp 265-278 With
1 fig [12 refs.]

Under this heading the author discusses the mode of infection of leprosy and comes to the conclusion that it is due to exposure to infection by a leper after the importation of a case into a previously unaffected area aided by a predisposition as only a small percentage of exposures result in actual infection. He thinks this predisposition is hereditary.

L R

GOMES (J. M.) *The Gomes Complement-Fixation Test in Contacts of Lepers*.—*Internat Jl Leprosy* Manila. 1935 July-Sept. Vol 3 No 3 pp 283-290

Observations on 56 cases led to the following conclusions. The test is not absolutely specific as fixation occurs in cases of tuberculosis osseous, deep mycosis tropical ulcer and leishmaniasis but all except tuberculosis present characteristic differential symptoms. In the search for home infections among the contacts of leprous persons such serological evidence is of great importance for the search for lepra bacilli in lymph nodes is difficult to carry out and the organisms are only occasionally found there.

L R

VAN DEN BRANDEN (F.) *Réaction de déviation du complément et réaction de flocculation effectuées simultanément sur du sérum de lépreux*. [Complement Fixation and Flocculation Tests in Leprosy].—*Ann Soc Belge de Méd. Trop* 1935 Sept. 30 Vol 15 No 3 pp 391-398.

After references to some previous French observations the author records that he obtained 36 per cent. of positive results with the Kahn reaction and 22 per cent with the Bordet Wassermann while two sera were anti-complementary. He thinks the positive reactions are mainly due to the great prevalence of syphilis and yaws in the Belgian Congo.

L R

DUBOIS (A.) & DEGOTTE (J.) *Séroflocculation syphilitique chez les lépreux (spécialement antigène-Bruxelles-flocculation)* [Sero-flocculation in Leprosy].—*Ann Soc Belge de Méd Trop* 1935 June 30 Vol 15 No 2 pp 201-207

The authors report on seroflocculation by three methods, that of Meinicke (M.T.R.) of Kahn and with the Antigen Brussels-Flocculation (A.B.F) in non-syphilitic and in syphilitic and yaws infected non-lepers and lepers, and record tables of their results from which they come to the following conclusions. Positive reactions are evidence of infection with syphilis or yaws for in accordance with the preceding history there is a difference between those with a positive and a negative history of those diseases in the results of from +25 to +70 per cent. The percentage of results is approximately the same whether lepra bacilli are rare or numerous which should not be the case if the leprosy infection influenced the results. The great

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frequency of yaws doubtless explained the positive results that were met with in lepers for the positive results in lepers of about 50 per cent. is the same as in the general run of patients in the hospital. Treatment with anti-syphilitic remedies should furnish confirmation. The Kahn method appears to be the most specific of those tested, the A.R.F. one the least so this result is in agreement with the findings of Bernard and Van den Branden.

L. R.

LIMA (Lauro de Souza) A sorologia da sifilis em face do tratamento antileprotico. [Serological Tests for Syphilis in Lepers under Treatment.]—Rev Leprologia de São Paulo 1935. Num. especial pp. 183-185

MONTERRAT has stated that leper patients whose sera are positive by the Wassermann or Kahn tests for syphilis may become negative as the result of prolonged administration of oil of chaulmoogra. The author proceeded to test this on patients at his leprosarium. Forty-seven were chosen in whom syphilis was suspected and whose sera gave a positive W.R. and 17 others Kahn positive. After treatment with chaulmoogra for periods of 6 to 24 months (total dosage of 107-500 cc.) the reactions were tested again. Of the W.R.+ 11 sera unchanged, 36 showed a reduction, and of the 17 Kahn+ the corresponding figures were 4 and 13. He therefore postulates two questions:
 1. How can we confirm a suspected diagnosis of syphilis in lepers?
 2. What grade have we of the results of antisyphilitic treatment in lepers?

At the Padre Bento Sanatorium the rule appears to be to group the patients as follows—

1. Those with a clinical history indicating syphilis and confirmed by a positive serum test. They are treated for syphilis and leprosy alternately—an insoluble salt of bismuth (the hydroxide) is given for $\frac{1}{2}$ months, then 2 months' interval during which the treatment for leprosy is given.

2. Those with a doubtful clinical history of syphilis, whose serum is negative. Here the difficulty is great and the usual rule is to give six injections of bismuth, note the result and test the blood again, 14 days after the last injection. [Presumably if the symptoms clear the syphilitic diagnosis is confirmed if not are the symptoms to be regarded as due entirely to the leprosy if the W.R. remains negative, as it probably would if it was so before the bismuth was given? The reason for testing the reaction again is not obvious.]

3. Those with a clinical history of syphilis, whose sera give varying results. Treatment of these is guided by the Kahn reaction (a) If the leprosy is of mild form and the Kahn negative the syphilitic aspect is disregarded. (b) If the Kahn is + or ++ antisyphilitic treatment is started if that for leprosy appears to be doing no good. (c) If a strongly positive +++ antisyphilitic treatment is taken in hand whatever the stage or condition of the leprosy H.H.S.

FABIANI (G.) La valeur des réactions de gélification sérique au cours de la lépre humaine. [The Value of the Formal-Gel Test in Human Leprosy]—C.R. Soc Biol 1935 Vol. 129 No. 22 pp. 13-14.

The gelification of sera on the addition of 2 drops of 40 per cent. formaldehyde or 0.1 per cent. lactic acid in leprosy is reported on.

The author concludes that the reactions with both agents give parallel results of very variable degrees but the test is of little practical value because similar results are obtained in tuberculosis syphilis and kala azar

L. R

BIER (Otto G) Ueber die Serologie der Lepra. IV Einfluss der Temperatur auf die Reaktionsfähigkeit des Lepraserums mit Tuberkulose und Lues-Antigen. [Serology in Leprosy Reactions of Antigens of Tuberculosis and Syphilis with Lepor Sera.] —Arch f Schiffs u Trop Hyg 1935 Dec. Vol 39 No 12 pp 516-519

The author reports having obtained 60 per cent. of reactions with leprosy tubercle antigens of Witebsky Khnogenstein and Kuhn. L. R.

BESTA (Bruno) & MARIANI (Giacomo) Il valore pratico della reazione di Rubino per la lebbra, studiato in Somalia. [Rubino's Reaction among Lepers in Italian Somaliland.]—Giorn Ital di Malat Esot e Trop 1936 Jan. 31 Vol 9 No 1 pp 11-14

The first part of this article gives a review of the results of Rubino's reaction which have been reported by investigators in different parts of the world. The authors next describe the technique of the modified form R.R.II and the scheme which they followed this is set out in the subjoined table.

Tube	1	2	3	4	5	6
Serum	0.50	0.25	0.10	0.50	0.25	0.30*
Saline	0.30	0.55	0.70	0.30	0.55	0.70
Fumalized suspension	0.20	0.20	0.20	—	—	—
Saline suspension	—	—	—	0.20	0.20	0.20

So in table, but probably a misprint for 0.10—Ed

They find that waiting for an hour before reading the results does not give safe results they read after 15 30 and 50 minutes. They examined 400 sera 301 normal, 29 syphilitic, 10 from tuberculous patients, 10 with chronic malaria, 46 proved lepers and 4 suspected of leprosy. None of the 350 in the first four of these gave a positive. Of the 46 from lepers, proved to be such both clinically and bacteriologically 24 only (52 per cent.) gave a positive 22 (48 per cent.) were negative. Fourteen of the 46 were nodular cases and only 4 were positive of 12 nerve cases only 2, but of 20 with the mixed forms 18 were positive. In general, the more advanced the stage of disease the greater the proportion positive. [No further reference is made to the 4 suspected cases.] Treatment seemed to have little effect on the result. The reaction therefore, has little value either in diagnosis or in evaluating the results of treatment. [See also this Bulletin 1930 Vol 27, p. 1006, 1931 Vol. 28 p. 961 1932 Vol. 29 p. 850]

WATANABE (Yoshimasa). Experimental Studies on Animals concerning Leprosy Report III. The Effect of Potassium Iodide on Animals inoculated with Leprosy—*Kaisetsu Arch. Experim. Med.* 1933. July Vol. 12 No. 3 pp. 304-312.

The author reports that when rats are repeatedly inoculated with rat or human leprosy tissue the former produces generalized rat leprosy but the latter only a temporary bacillus-containing nodule at the site of the injection. The weekly injection of iodide of potassium in 0.05 gm. per 100 gm. body weight caused a temporary increase in the lepromatous lesions in both cases.

L.R.

WATANABE (Yoshimasa) Experimental Studies on Animals concerning Leprosy Report IV Allergy and Inoculation of Lepra Material—*Kaisetsu Arch. Experim. Med.* 1935. Oct. Vol. 12 No. 4 pp. 355-361.

This worker finds that the inoculation of insusceptible rats with emulsions of human lepromatous nodules produces only a mild and temporary reaction in the form of a small localized nodule, but on repeated inoculations with the same strain the reaction becomes stronger and the nodules larger and more persistent. Further when monkeys are inoculated with either human or rat lepromatous material the intermediate reaction subsides in a day or two but after an interval hard nodules appear at the site of inoculations. With repeated inoculations the initial reaction is not absorbed, but a hard nodule is formed, which may even go on to ulceration. The rat strain caused stronger reactions in monkeys than the human one. He concludes that an initial inoculation of lepromatous emulsions into white rats and monkeys causes a certain degree of subsequent allergy.

L.R.

SOULE (J. H.) The Relationship of Human Leprosy and Rat Leprosy A Study of Wild Rats captured in the Calion Leper Colony—*Indones. Jl. Leprosy* Manila 1935. July-Sept. Vol. 3 No. 3 pp. 291-310 [30 refs.]

The possibility of infection of rats naturally with human leprosy has been examined in the very favourable conditions of the Calion Leper settlement with negative results, for 212 trapped rats showed not a single leprosy infection. Moreover inoculations of abundant human lepra bacillus-containing tissue into 23 Calion rats, and 11 control rats on another island, all gave negative results. Although rats can readily be infected by the inoculation of small quantities of rat lepromatous material, all efforts to cultivate the organism failed. The author rejects the claim of Walker and Sweeney to have cultivated the organism of leprosy.

L.R.

NAKAMURA (K.) KORASHI (S.) & MATSUO (I.) Inokulationsversuche der Menschenlepra auf Hausratten. II Mitteilung [Inoculation of *R. norvegicus* with Human Leprosy Material]—*Japanes. Jl. Experim. Med.* 1935. Oct. 20. Vol. 13 No. 5 pp. 619-628. With 13 figs. (2 coloured) on 5 plates.

This paper deals with the inoculation of human lepromatous material into young house rats (*Rattus norvegicus norvegicus*) after the removal from them of the thyroid gland and the parathyroids. Of 34 rats 20

treated 17 or 50 per cent. developed leprosy lesions with a clear picture of granulation tissue in the skin testicles and lymph-glands containing innumerable lepra bacilli and globi in the affected areas. This shows that their susceptibility was increased by the previous operation, for unoperated control animals did not contract the disease although long continued efforts were made to infect them. Further tests were made in the case of healthy young white rats after removal of the thyroid gland with negative results although it was easy to infect the house rats under similar conditions.

L. R.

WAYSON (N. E.) & MASUNAGA (Eichi) Rat Leprosy Observations concerning Transmission of the Infection through the Nose—*Public Health Rep.* 1935 Nov 8. Vol. 50 No 45 pp 1576-1581 With 4 figs. on 2 plates.

This is an interesting inquiry into the natural modes of infection of rat leprosy. The author concludes 1 Acid fast bacilli have frequently been found in the noses of wild rats infected with leprosy like disease of rats and likewise in white rats experimentally infected by subcutaneous inoculation. 2 Normal white rats in prolonged direct or indirect contact with infected rats harboured acid fast bacteria in the nose and developed the disease under the conditions of the experiments. 3 Rat leprosy has developed in white rats subsequent to the instillation of a suspension of rat lepromata into the nostril without trauma to the nasal mucous membrane. L. R.

MARCHOUX (E) CHORINE (V) & HOECHLIN (D) Infection lèpreuse des rats par la voie oculaire [Lepra Infection of Rats via the Conjunctiva]—*Ann Inst Pasteur* 1935 Dec. Vol. 55 No 6 pp 632-640 With 3 coloured figs. on 1 plate. [11 refs.]

In view of the frequency of nasal involvement in human leprosy possibly through infection via the lachrymal duct and of the demonstration by CALMETTE that laboratory animals can be infected through the conjunctiva with the acid fast bacillus of tubercle the authors have applied emulsions of rat lepromata to the conjunctiva of healthy rats and traced the penetration of the causative bacilli through the mucous membrane by drapery of leucocytes that have engulfed them. On killing the rats after 12 to 18 months no visible external leprosy lesions were noted but on careful microscopical examination it was found that although the eye itself was not involved the leprosy organisms were found in the lymphoid tissue at the internal angle of the eyelids and in the lymphatic glands of the neck and even in those of the axilla. It therefore appears to be likely that in human leprosy any bacilli that may be deposited on the conjunctiva by a contaminated finger may gain access to the local lymphatics, but infection of the eye itself is not the result of a local infection it is part of a generalization of the disease.

L. R.

LAMPE (P. H. J) & DE MOOR (C. E.) Ratten-lepra. [Rat Leprosy]—*Geneesk. Tijdschr v Nederl Indië* 1935 Nov 26. Vol. 75 No 24 pp 2033-2049 With 8 figs. on 2 plates. English summary

Attempts at the experimental infection of 56 young white rats either by percutaneous inoculation of the skin of the belly after shaving

so as to cause slight bleeding or by subcutaneous injection into the root of the tail of lymph node emulsions from naturally infected leprosy rats in Batavia are recorded, some of the animals being fed on a vitamin deficient diet, the animals being kept under observation for 1½ years. In rather over 80 per cent infection occurred by either method, usually within four to ten months, with the occurrence of enormous number of the bacilli in the skin lesions, mostly intracellular. Lepromata resembling those of cutaneous leprosy in man not infrequently occurred at the site of inoculation and glandular involvement and ulceration might follow. Vitamin B₁ deficiency had some influence in aiding the development of the disease after percutaneous inoculation with moderate doses. The virus appeared to behave more like a saprophyte than a parasite. *L. R.*

TAROV (L.) Contribution à l'étude des huiles chaulmoogriques indigènes du Congo Belge. [Chaulmoogra Oils in Trees Indigenous to the Belgian Congo.]—*Bull. Agric. Congo Belge*. 1935. Sept. Vol. 26. No. 3. pp 315-321

The various trees in different countries that yield oils containing chaulmoogenic and hydrocarpic fatty acids belong to the family of Flacourtiaceae. The author has studied those of the Belgian Congo and West Africa namely *Oscoba glans* or *Caloncoba glans* and *Caloncoba Nodosa* and he gives analyses of *Caloncoba glans*. This he states is superior to the others in richness in fatty acids possessing rotatory powers, the percentage amounting to 31.47 of the seeds. The fatty acids have a density at 20°C. of 0.940 a refractive index at 40°C. of 1.4785 an acid index of 3.25 a saponification index of 190 an ether index of 180.34 an iodine index of 98.10 a deviation of the polarimeter at 20°C. of 46.08 and a specific rotatory power of 49.02. The melting point is 54 to 56°C. the index of neutralization 204 and the mean molecular weight 273. He therefore concludes that this oil is a very promising one in the treatment of leprosy.

L. R.

DE MELLO (F.) & LOROLA PEREIRA (O.) Les injections intraveineuses d'huile de chaulmoogra. [Intravenous Chaulmoogra Oil in Leprosy].—*Bull. Soc. Path. Exot.* 1935 Oct. 9 Vol. 28. No. 8 pp. 700-701

This very brief note records that 45 leprosy cases have been treated by about 1000 intravenous injections of chaulmoogra oil by the method of Labernadie without accident except in one complicated by pulmonary tuberculosia. He thinks this plan more efficacious than other forms of administration. *L. R.*

HUECK (Otto) Ueber Lepra Behandlung in der Canton-Provinz. [The Treatment of Leprosy in Canton].—*Arch. f. Schiffs- u. Trop. Hyg.* 1935 Nov. Vol. 39 No. II pp. 464-474

The author reports the use of alepol and ester chaulmoogrates in leprosy cases in Canton with somewhat variable results. More physicians are required to tackle the problem effectively in that very leprous region. *L. R.*

MONTEL (M. L. R.) & TRUONG-VAN QUE. Un cas de lèpre généralisée (forme mixte) associée au paludisme et traitée uniquement par le bleu de méthylène combiné au rouge neutre de toluène en solution à 1/100. Observation et bilan après 7 mois 10 jours de traitement.—*Bull Soc Méd-Chirurg Indochine* 1935 Feb - Mar Vol 13 No 2 pp 58-71 With 2 figs.

& — Un cas de lèpre généralisée (forme mixte cutanéo-nervouse et tuberculo-maculeuse) traité par le rouge neutre associé au bleu de méthylène. Observations et bilan après cinq mois de traitement. [Cases of Mixed Leprosy treated with Methylene Blue and Neutral Red]—*Ibid* pp 72-78

The first of these cases was a bacteriologically positive dermal one in which, after seven months treatment with 25 injections in two series, containing a total of 5.55 gm of methylene blue and eight containing a total of 0.58 gm of neutral red, lesions in the testicles cleared up with return of the sexual functions as well as those of the skin, but as lepra bacilli could still be found in the dermis the treatment will be continued with the addition of chaulmoogra preparations

The second case was originally negative bacteriologically but the dermal lesions completely disappeared under the same treatment.

L R

- i. TRUONG-VAN-QUE. Un cas d'infantilisme lépreux traité par la méthode de M. L. R. Montel. (Bleu de méthylène intraveineux) Observation et bilan après cinq mois et onze jours de traitement [The Treatment of Leprosy by Dyes.]—*Bull Soc Méd-Chirurg Indochine* 1935 Apr Vol 13 No 3 pp 247-256 With 2 figs.
- ii. MONTEL (M. L. R.) LE VAN PHUNG NGUYEN VAN KRAI TRAN-VAN HANH DO-VAN HOANH TRUONG-VAN QUE & NGUYEN-NGOC NHUAN. Observations résumées de vingt cas de lèpre chez des jeunes. Traitement par le bleu de méthylène seul ou associé au chaulmoogra.—*Ibid* May No 4 pp 337-361 [24 refs.]
- iii. DE RAYMOND. Le traitement de la lèpre au Tonkin par les colorants.—*Ibid* pp 440-441
- iv. DE FAJOLE. Note thérapeutique sur le traitement de la lèpre par les colorants.—*Ibid* p 442
- v. VU NGOC ANH. Traitement de la lèpre par le bleu de méthylène et l'osme à la léproserie de Ván-môn.—*Ibid* pp 443-451
- vi. DOROLLE (P.) & NGO-QUANG-LY. Résultats obtenus après quatorze mois d'expérience du traitement de la lèpre par les colorants. (Bleu de méthylène et eosine-bleu).—*Ibid* July-Aug No 6 pp 675-706.
- vii. FRÉVILLE (L. H.). Le traitement de la lèpre par la méthode de M. L. R. Montel. (Résultats après un an d'expérimentation).—*Ibid* pp 707-718. [10 refs.]
- viii. DUBOIS (A.). A propos du traitement de la lèpre au bleu de méthylène.—*Bull Soc Path Exot.* 1935 July 10 Vol 28. No 7 pp 550-551
- ix. MONTEL (R.). La chromothérapie de la lèpre. Etude générale.—*Ibid* pp 616-626 [43 refs.]
- x. — A propos de la communication de Mme. E. Delanoë le bleu de méthylène compris dans le traitement mixte de la lèpre

- et de la discussion de cette communication.—*Ibid.* Oct. 9
No. 8, pp. 695-696.
- x. — & TRAY VAN HANH. Un cas de lépre cutanée tuberculeuse généralisée récente traité par le bleu de méthylène. Blanchiment clinique et bactériologique.—*Ibid.* pp. 696-700

i. This note records a case of leprosy in a girl of twenty with infantile development who improved greatly in her symptoms and development under methylene blue treatment for three months.

ii. Brief notes are given of twenty cases in children and adolescents treated by a combination of methylene blue intravenously and injections of chaulmoogra preparations. All the cases showed improvement, and in half the clinical symptoms were cleared up. In three-fourths the discharge of lepro bacilli from the nose ceased, and in half the organisms could no longer be found on microscopical examination of the lesions. In three cases relapse took place after one to six months, and in three pustules occurred in the course of treatment followed by improvement. In all the cases the size of the nerves was reduced.

iii. The very brief note by Raymond records that 89 patients had been treated since June 1934 with intravenous injections of methylene blue and other dyes including eosin, fluoresceine and fuchsin, with unsatisfactory results, as apart from some temporary remission of symptoms no clear manifestations of any curative action were observed. On giving up the use of the dyes and using hyposulphite of magnesium and chaulmoogra preparations more favourable local and general improvement was obtained.

Fajole also reports that methylene blue was without any specific effect.

iv. This paper reports on fifteen cases treated with 1 to 2 per cent. solutions of methylene blue and of eosin intravenously. Two of them showed definite benefit, and six more showed slight improvement. On the other hand in three cases the activity of the disease appeared to be increased even when temporary improvement had at first been noticed. There was no difference between the two dyes for with both improvement in the appetite and in the healing of ulcers was only momentary in all but two cases. This was not due to deficiency of dosage as Montel's method was strictly followed.

v. Fourteen months experience of the dye treatment is recorded in this paper with short notes of 30 cases, including 1,313 intravenous injections, about half having been of methylene blue without any ill results. For this purpose they use the following formulae of Perier. A solution of 1 per cent. methylene blue RAL, neutralized (pH 7.4) and isotonic, filtered and sterilized by Tyndall's method. A solution of 2 per cent. eosin-blue (1/50 eosin RAL, 9/50 methylene blue RAL neutralized (pH 7.35) isotonic, filtered and sterilized by Tyndall's method. Of 55 lepers treated 17 did not continue the treatment sufficiently long less than 18 injections, and 8 recent cases are also excluded from consideration for various reasons. They found no difference in the value of the two solutions, but prefer 2 per cent. eosin-blue, of which they injected totals of from about 500 to over 1,000 cc. in the course of 2 to 13 months. In 23 cases improvement was noted with complete clearing up of the lesions in 7 slight improvement in 9 moderate in 7 and very marked in 7. Nodules, ulcers and infiltrations were nearly always improved, but erythematous, tuberculous and macular lesions were less influenced. Pains

and sleeplessness were relieved as well as thickening of nerves and muscular atrophies causing deformities of the hands. Pustules with elimination of the lepra bacilli and reactions in the nerves were followed by benefit. On the other hand very little action on the lepra bacilli was observed, for in only 2 of 18 cases did they disappear from the nose and in no case from the cutaneous lesions. They advise combining the use of the slower action of chaulmoogra preparations with the more active action of the dyes.

vi. This author also advocates the combined use of Mercado's chaulmoogra formula with the dye treatment and he reports on 10 months experience with very similar results to the above but he remarks that it is too soon to speak of cures.

vii. The author reports the unsuccessful prolonged use of the dye treatment in full doses.

viii. In this note Montel summarizes the results he has obtained from the use of various dyes in leprosy. He commences by emphasizing that they do not replace the established value of chaulmoogra preparations as the basis of the treatment of the disease. Trypan blue he soon gave up on account of its injurious effects in producing albuminuria. Brilliant green he found to exert little beneficial action. Neutral red is also badly borne and causes fever, vomiting and toxic symptoms but in doses not exceeding 10 to 12 cc. and beginning with only 2 to 3 cc. increased by 1 cc. at a time it provokes reactivation of the lesions and renders methylene blue more effective. On the other hand methylene blue can be continued for long without any harm, and it clearly reinforces the action of chaulmoogra treatment when given as described in previous papers. The methylene blue is more active than chaulmoogra but the latter has a more lasting effect and protects more usually from relapses. The association of eosin and methylene blue as given by G. Ryane is comparable with the latter alone. Fluoresceine-Uranine and resorcinol are also of value.

ix. In this brief note Montel criticizes DELANOE's unfavourable report on methylene blue treatment on the grounds of insufficient treatment and of his omission to use chaulmoogra treatment as well.

x. This is a report of a case of generalized cutaneous leprosy completely cleared up with disappearance of the lepra bacilli from the lesions and improvement in the nerve symptoms under methylene blue treatment.

L. R

FERNANDEZ (José M. M.) & SCHUJMAN (Salomon) Nuestra experiencia acerca del valor de algunas anilinas en el tratamiento de la lepra. [Experiences with Aniline Dyes in the Treatment of Leprosy].—Rev. Leprologia de São Paulo 1935 Sept. Vol. 2 No. 3 pp 157-168. [10 refs.]

The authors tested the following—

1 Trypan blue A 4 per cent. solution filtered, sterilized and kept away from light was used for 7 patients in an advanced stage of leprosy. Five cc. given intravenously was well tolerated by all 4 days later 10 cc. of a fresh solution prepared 12 hours before were injected. All the patients felt ill, and complained of precordial and epigastric pain, nausea and shivering but with one exception all recovered in 15 minutes. This patient who showed an intenso leprous reaction passed almost at once into a state of coma and died in 5 minutes. No further trials were made with this preparation.

2. *Fluorescein* a 2 per cent. solution in 2 per cent. bicarbonate of sodium solution injected twice a week starting with 5 cc., then 10 cc. and going gradually to 20 cc. without giving rise to any signs of intolerance. Thirty two patients, mostly in an advanced stage, were thus treated 29 had previously had chaulmoogra. Three patients with acute iritis seemed to benefit but no effect was observed in any of the others.

3. *Bonney's blue* which is a mixture of brilliant green and crystal violet of a strength of 0.5 gm. of each in 2½ litres. Fourteen were thus treated, starting with 3 cc. Intramuscularly this, however, caused abscesses and intradermal infiltration of 4 cc. was given twice a week, and a month later this was combined with intravenous injection of 10 cc. After 20 weeks treatment 2 had made a little improvement, 4 were worse and 8 remained stationary. All but one had previously received treatment with chaulmoogra.

4. *Eosin* 2 per cent. solution injected intravenously twice a week in doses of 10 cc. was tried in 7 patients with the leprosy reaction, but no improvement was observed in any of them.

5. *Methylene blue* 1 per cent. aqueous solution injected intravenously in doses starting at 5 cc. and increasing to 20 cc. injection being given every 3 days. Fourteen patients were thus treated. No beneficial effect was observed regarding the general condition, or clinical or bacteriological manifestations. On the leprosy reaction in four cases the condition became frankly worse in three others there was no change.

In brief these aniline dyes were inferior in action to chaulmoogra and its derivatives.

H H S.

Montez (M. L. R.) A propos de trois communications sur le traitement de la lépre par le bleu de méthylène (ce bulletin No. 4 mai 1935. T. XIII—P. 440 à 451)—Bull. Soc. Afr.-Côte-d'Ivoire. 1935.

Sept. Vol. 26. No. 7 pp. 783-787 (Discussion par le Docteur DOROLLE pp. 797-798)

Nautzen van-Tuoro. A propos du traitement de la lépre par le bleu de méthylène.—Ibid. pp. 789-805.

Borzonik (A.) El azul y el rojo de metileno en el tratamiento efectivo de leprosos.—Rev. Méd. Peruana. 1935. Nov. Vol. 7 No. 83. pp. 875-878.

SORLEY (J. T.) The Use of Brilliant Green Intravenously in the Treatment of Leprosy—West African Med. Jl. 1934 Oct. Vol. 8. No. 2. pp. 13-14

A trial of 1 per cent. brilliant green intravenously in the small doses of 3 to 5 cc. twice a week produced albuminuria and jaundice in some cases, but considerable clinical improvement was noted in cases previously on alepol. L R.

BRAGA (Renato) Tratamento da lepra pelo azul de metileno. [Treatment of Leprosy by Methylene Blue].—Rev. Leptologia de São Paulo. 1935. Num. especial. pp. 7-32.

An interesting paper giving details of 63 patients with different forms of leprosy and stages and combinations of them treated with injections of 1 per cent. methylene blue in distilled water. The opinion

gained from these is temperately expressed. Injections were given intravenously in increasing doses at 3-4 day intervals. Many of the patients were in an advanced stage some were quite intolerant of chaulmoogra and its derivatives but after a course of the dye were enabled to take the specific drug. It may be that the methylene blue serves as a vector for other antilepra remedies (MONTEL recommends it being given with chaulmoogra) bringing about a state which leads to a better or more intense action of these others. At all events whatever be its mode of action the author maintains that though he has not used the dye in sufficient cases to venture an opinion on its merits in general, nevertheless the good effects observed in some of them warrant further trial.

H H S

MAURANO (Flávio) Os resultados do tratamento pelo azul de metileno endovenoso Segundo a técnica de Montel sob o ponto de vista dermatológico [Methylene Blue Intravenously in Leprosy]—*Rev Leprologia de São Paulo* 1935 Num especial, pp 33-37

Dr Maurano expresses an opinion markedly at variance with the above. He is particularly concerned with the skin lesions due to or associated with leprosy. Forty four patients in all stages of the disease were given injections of methylene according to Montel's technique. He concluded that only one improved while in seven the general state was worse and in another 11 the skin lesions were aggravated. In the author's view not only is it without efficacy but is even harmful. In 25 per cent. of the patients the skin lesions were worse after its use and in 18 per cent. the general condition was aggravated all the rest with one exception were unaffected.

Twenty-six of the 44 presented the leprous reaction only one patient benefited from the methylene blue five showed an increase in four it was reduced.

H H S

DE CARVALHO (J. Corrêa) Tratamento da lepra pelo azul de metileno no asilo-colonia Aymorés. [Methylene Blue in Leprosy Results at the Aymorés Leprosy Colony]—*Rev Leprologia de São Paulo* 1935 Num. especial, pp 38-43

Notes are given of 16 cases one nodular the rest mixed treated by Montel's method. Of these 4 were worse 3 slightly improved and 9 showed distinct amelioration. The author gives a summary without individual details of 51 cases 43 with mixed, 8 with the nervous form of the disease. The results varied considerably in 14 he noticed retrogression of lepromata, but in three it seemed to provoke ulceration. He concludes that it merits use as an adjuvant.

H H S

VALENTE (Edison Costa) & BECHELLI (Luiz Marino) O azul de metileno no tratamento das reações leprosas. [Methylene Blue in Treatment of the Leprous Reaction]—*Rev Leprologia de São Paulo* 1935 Num. especial, pp 44-53.

Thirty-seven patients, 13 with the nodular form and 24 with mixed leprosy received the methylene blue treatment for the leprous reaction. Note is given of each, but the results may be summed up by saying that 6 were cured, 5 much relieved, 2 slightly improved, 9 were worse and the remaining 15 were not affected. The doses given were small

(to 20 cc.) average (20-25 cc.) and high (more than 25 cc.). Of those cured 3 had high, 2 average and 1 small doses of those much improved 3 1 and 1 respectively of those made worse 4 had large, 1 average and 4 small doses. In short, administration of the dye was followed by marked benefit in 11 and some benefit in 13 of the 33 cases, and generally better results were obtained from the use of doses exceeding 25 cc.

H H S.

BECHELLI (Luis Marino) O azul de metileno no tratamento das algias leprosas. [Methylene Blue in the Neuralgias of Leprosy.] —*Rev Leprologia de São Paulo* 1935. Num. especial. pp. 54-67

Fifteen patients with mixed leprosy and suffering from neuralgic pains were treated by injections of methylene blue. The author speaks of the results in terms of high praise. In one only did it fail to give relief. In eight the smaller doses sufficed, six had the large doses intermediate doses did some good to four of the latter but the larger doses gave greater benefit. Some exhibited untoward symptoms such as vertigo, ptomaine, shivering attacks. In six it seemed to precipitate the leprous reaction, but in four the eruption was vastly improved after the injections.

H H S.

ARANTES (Francisco Ribeiro) Acidentes observados no tratamento da lepra pelo azul de metileno (Método de Montel). [Ill-Effects observed in Lepers treated by Montel's Methylene Blue Method.] —*Rev Leprologia de São Paulo* 1935. Num. especial. pp. 68-74

The author's opinion is based on a comparatively small number of cases (50). He found that methylene blue injections had an anæsthetizing effect on the acute febrile attacks, but only transiently. It proved beneficial in about half his patients suffering from pain, neuralgic or neuritic, not only relieving the pain but giving longer periods of freedom. On the other hand it may precipitate a leprous reaction in patients hitherto free from this. The drug is not harmless, is not well eliminated and may set up a toxic hepatitis associated with diarrhoea, and it may prove fatal by causing atrophy of the liver. Two patients died. The author concludes, therefore, that "methylene blue in the doses recommended by Montel is toxic and fraught with danger."

H H S.

JUNIOR (João de Moraes) Tratamento das algias em doentes de lepra. [Treatment of Pains in Leprosy].—*Rev Leprologia de São Paulo* 1935. Num. especial. pp. 75-90.

The author has treated 30 lepers suffering from the mixed form with pain in nerves and joints by means of *Crotalus anavenin*. Seven of these had had various other methods of treatment without obtaining relief and of these detailed notes are given. The usual procedure was to wait for 8 days after the last form of treatment and then begin with the anavenin, injecting subcutaneously daily in or near the painful region. In one patient with the pain very persistent two injections were given in a day. In 14 of the total 30 the results were recorded as excellent another 14 were considerably relieved, and there were only two failures. The dose was 0.1 mgm. and in many the pain disappeared after 6-8 injections, but usually a course of 8-10 was

given. The relief seems to have been prolonged when seen 1-3 months afterwards the patients were still free. Others who had a slight return received further injections with benefit H H S

NOCHT (Bernard) & VELASCO (Felix) Some Experiences in the Treatment of Leprosy by Artificially Induced Fevers Preliminary Report.—*Jl Philippine Islands Med Assoc* 1935 Nov Vol 15 No 11 pp 602-609

The authors were led to try the drugs now being used to produce fever in the treatment of G.P.I. by reports of improvement after attacks of kala azar smallpox and protein shock. Pyrifex sulfosin and anaesthesulf have been used but only the first to any material extent because the patients refused to continue with sulfosin on account of the severe pains it induced and this was also a drawback with anaesthesulf beginning some hours after the injection in addition to which bronchial irritation was sometimes caused by both of them. Pyrifex was however given to six cases in three or four series of 10 injections each, without after ill-effects except chills and headache and the high fever of from eight to ten hours up to 104°F was well borne. Leucocytosis and prolongation of the sedimentation time were observed during the fever. Only one patient showed any marked improvement and he differed from the rest in showing very strong febrile reactions after small doses from the first. Further trials are being made. Pyrifex is a sterilized suspension of a non pathogenic bacillus of the coli group in 7 different strengths containing from 50 to 5 000 units by means of which graduated febrile reactions can be obtained.

L R

BASU (N. K.) Diets in Relation to Diseases with Special Reference to Tuberculosis and Leprosy—*Jl Indian Med Assoc* 1935 Oct. Vol. 5 No 1 pp 8-9

ATHAVALE (V. B.) Myiasis and Leprosy—*Jl Indian Med Assoc* 1935 Oct. Vol. 5 No 1 pp 10-12.

DE ABREU (Manoel) Tratamento anti leprótico em Santo Angelo e seus resultados.—*Rev Leprologia de São Paulo* 1935 Num. especial. pp 115-151

LIMA (Lauro de Souza) Método de infiltração intradermica ou plancha.—*Rev Leprologia de São Paulo* 1935 Num. especial. pp 167-173

HUIZURGA (Lee S.) Human Sterilization and its Application in Leprosy.—*Jl Philippine Islands Med Assoc* 1934 Dec. Vol. 14 No 12. pp 469-478

RABIES.

A REVIEW OF RECENT ARTICLES XXIV.

I. Virus.

In a paper published in 1932, REPETTO (this Bulletin 1933, Vol. 30, p. 141) drew attention to the existence of foci of rabies in the lower Congo. These were at Kasai, at Coquilhatville, at Kivu, at Kwango and in the Bas-Uélé. The symptoms were of the *oulou-fato* type. MATTLET¹ has discovered another focus at the Urundi. It has been periodically discovered in this locality and one can conclude that the Urundi constitutes a permanent focus of the *oulou-fato* type of rabies."

A report on rabies in cattle and horses in Santa Catharina (Brazil) is presented by de Freitas LIMA.² This subject has frequently been referred to in these reviews, in particular in summarizing the work of de Queiroz LIMA (this Bulletin 1934 Vol. 31, p. 637) of Tousc (1932, Vol. 29, p. 596) and of HUXEL and PAWAK (1932, Vol. 29, p. 595). The author of the present article contributes no new facts, and is guarded as to the mode of transmission of the epizootic in nature.

REMLINGER and BAILEY³ in an article commemorating the 50th anniversary of the application of Pasteurian treatment to man, describe the procedure to be adopted in examining a strain of rabid virus. This includes the study of the symptoms in the rabbit, the behaviour of the virus to desiccation, to glycerine, to dilution, to ether and to antiseptics, and finally the determination of its immunizing power. They stress the fact that neither the virus of Bocast in its 2,582nd passage, nor the virus of Tangier in its 1,550th passage shows any indication of having lost immunizing power.

The comparative efficiency of immersion in glycerine and of freezing for the preservation of virulence has been examined by LIMON⁴. He points out that the usual practice of preserving in glycerine has the recognized disadvantage that that substance is a mild antiseptic. He has shown that undried medulla gradually loses virulence when kept in 30 per cent. glycerine at 0°C until between the 14th and the 30th day it has completely disappeared whilst the virulence of frozen medullae remained intact up to the 70th day.

It is well known (HARVEY and McKEENOCK, Scientific Memoirs, Govt. of India No. 30 1907) that when cords dried over various periods are tested for infectivity the most marked effect is a reduction in the percentage infected. There may be some delay in incubation

For the twenty-third of this series see 1933 Vol. 32, p. 603.

¹ MATTLET (G.) Contribution à l'étude de la répartition des foyers de rage canine au Congo Belge.—*Ann. Soc. Belge de Med. Trop.* 1933, June 30, Vol. 13, No. 2, pp. 221-223.

² LIMA (C. d. Freitas) A rabi em Santa Catharina.—*Rev. Depart. Nac. do Product. Animal.* Rio de Janeiro. 1933, Vol. 1 Nos. 5 & 6, pp. 41-69. With 9 figs. [23 refs.] English summary.

³ REMLINGER (P.) & BAILEY (J.) Comment procéder à l'expertise d'un virus rabique fixé?—*Bull. Inst. Pasteur* 1935, July 15, Vol. 33, No. 12, pp. 609-617.

⁴ LIMON (Pierre) Action comparée de l'immersion en glycerine et de la congélation sur la conservation de la virulence des modèles rabiques.—*C. R. Acad. Sc.* 1935, July 8, Vol. 201, No. 2, pp. 173-174.

but this is not so obvious. This was ascribed by the above authors to the centripetal effects of the drying of the cord from without inwards. LÉPINE and CRUVEILHIER⁴ ascribe the phenomenon to the loss by desiccation of the virus of its faculty to travel along nerves (neuroprobastie). They state that if a heavy emulsion of a fresh cord is inoculated into a cut sciatic nerve infection takes place 8 out of 9 times whereas if the emulsion is one of a cord dried even for 24 hours infection never follows (24 guineapigs inoculated) [This observation clearly requires to be confirmed]

It will be remembered that NICOLAU and KOPCIOWSKA succeeded in retransforming fixed virus into street virus by subpassage by way of the sciatic nerve (this *Bulletin* 1934 Vol. 31 p. 637 and 1935 Vol. 32, p. 605). KOPCIOWSKA⁵ now investigates the behaviour of the retransformed fixed virus when inoculated into the dog. He finds that Negri bodies are present in large numbers (up to 98 bodies per 100 neurones). Intense negriogenesis and septinévrise are the attributes which characterize the retransformed virus.

FUNAYAMA⁶ reports an ingenious experiment in which the filtrability of the virus of rabies is tested *within* the animal body. Small filters (either porcelain bougies or celloidin sacs) containing virus emulsion are introduced into the lateral ventricles of rabbits and left *in situ*. The test was of course whether the rabbit developed hydrophobia. Using Chamberland L₁ bougies 2 out of 13 were infected, with L₂, 3 out of 19 with L₃, 4 out of 21. With celloidin sacs 30 out of 54 were infected. Various strains of fixed and street virus were used but there seemed to be no difference in their filtrability.

A thorough and painstaking though fruitless research has been carried out by WALDRECKER.⁷ He has tried by various methods to cultivate the rabies virus and has not succeeded. He has tried to cultivate it in symbiosis with 10 different yeasts with 2 strains of *Saccharomyces cerevisiae* and with the same organisms on egg medium. He has tried cultivation on the chorion allantois of the hen embryo in cultures with embryonic tissue anaerobically in conjunction with mouse carcinoma on a Chinese egg medium, and *in vivo* in a growing mouse carcinoma. The results have all been negative.

On the other hand ISABOLINSKI LEWZOW and TSCHERNJAK⁸ claim to have cultivated the virus in symbiosis with yeasts. To a 10 cc. tube of bouillon to which a loopful of yeast culture has been added 0.1 cc. of a 1 in 20 emulsion of the brain of a rabbit which died of

⁴ Lépine (P.) & Cruveilhier (L.) Action de la dessiccation sur la neuroprobastie du virus rabique.—*C. R. Soc. Biol.* 1935 Vol. 119 No. 27 pp. 1338-1340

⁵ Kopciowska (L.) Sur le virus rabique fixe pasteurien "ramené en arrière" (transformé apparemment en virus des rues après passages répétés dans le système nerveux périphérique du lapin).—*C. R. Soc. Biol.* 1935 Vol. 190 No. 19 pp. 403-406. With 1 fig.

⁶ Funayama (Junichirō) Experimental Studies on Rabies. II. A Test of the Filtration of the Hydrophobic Virus in Animal Bodies.—*Oriental J. Dis. Infects.* 1935 May Vol. 17 No. 3 [In Japanese English summary pp. 21-24 With 5 figs. (2 on 1 plate)]

⁷ Waldrecker (Max) Versuche zur Züchtung des Lymavirus.—*Zent. f. Bakteriol. L. Abt. Orig.* 1935 Nov. 15 Vol. 135 No. 4/5 pp. 259-282.

⁸ Isabolinski (M.) Lewzow (L.) & Tschernjak (L.) Ueber die Züchtung des Pocken und des Lymavirus auf Hefekulturboden.—*Giorn. di Bacteriol. e Immunol.* 1935 Jan Vol. 14 No. 1 pp. 111-116 English summary (3 lines)

rabies is introduced. This is incubated at 37°C. for 3 days, and then reinoculated in the same proportions into another yeast bouillon tube. As controls, similar passages are made into tubes to which yeast has not been added. Rabbits are inoculated from time to time with 0.2 cc. intradurally. The yeast mixtures were infective up to the 11th generation whilst the controls were non-infective. It was also found possible to use yeast agar in place of yeast bouillon.

An experiment of a curious nature has been carried out by BOZZELLI.²⁰ A mixture of equal parts of fixed virus and street virus was inoculated into groups of guineapigs, rabbits, and dogs, in four different positions, viz. subdural, anterior chamber of eye, muscles of neck and intramuscularly into a limb. In each group there were five animals, and two controls, one for street virus alone, and the other for fixed virus alone. The virus which caused death was determined in each case from the incubation period, and by its behaviour on subpassage. The results may be summarized as follows —

		Fixed Virus	Street Virus
Subdural —	Guineapigs	5	0
	Rabbits	4	1
	Dogs	3	2
Ant. Chamber —	G.P.	5	0
	Rabbits	5	0
	Dogs	1	4
Muscles of Neck —	G.P.	3	2
	Rabbits	2	(1 escape)
	Dogs	1	4
Muscles of Limb —	G.P.	0	5
	Rabbits	0	4
	Dogs	0	(1 escape)

The two controls for the first 3 positions gave satisfactory incubations. In the case of those inoculated into the muscles of the limb the fixed virus control in guineapigs had an incubation period of 22 days, whilst in rabbits and in dogs it failed to infect; the incubations with street virus were 12, 13 and 14 days respectively.

The net results of this experiment would appear to be that fixed virus as was to be expected, was the "winner" where the mixture was inoculated into nervous tissue directly and gave place to street virus when inoculation was into muscles, and that the guineapig was the most susceptible to fixed virus, the rabbit rather less, and the dog the least susceptible.

That certain strains of fixed virus, such as the Tunis strain, have the potentiality in undue degree of producing Negri bodies is shown by LEVADITI and SCHONR.²¹ Three strains of fixed virus were com-

²⁰ BOZZELLI (Roberto). Studio comparativo sul comportamento della cavia, del coniglio e del cane trattati con inoculazioni sierofitose di virus rabies fisso e di strada. Ricerche sperimentali. —Gior. di Bactiol. e. Immunol. 1935 Feb. Vol. 14 No. 2 pp. 281-304. [47 refs.] English summary (9 lines).

²¹ LEVADITI (C.) & SCHONR (R.). La potenzial negritina dos virus rabies fixos. —O R. Soc. Biol. 1935 Vol. 119 No. 23 pp. 811-815. With 2 figs.

pared. In the Paris strain the bodies were very small and few showed inner structure they were absent in the dog and excessively rare in the rabbit and mouse. In the Tangier strain the bodies were rare sometimes had inner structure were found in the horn of Ammon of the dog were absent in the rabbit and were very rare in the mouse. In the case of the Tunis strain bodies were found in the rabbit in the horn of Ammon though in reduced numbers. They were absent in the dog but frequent in the mouse.

LEVADITI and SCHORR¹³ have further investigated the oxyphil corpuscles analogous to Negri bodies which are found in the cytoplasm of the corneal epithelium in animals inoculated with street virus (this Bulletin 1934 Vol. 31 p 145). It appears that three strains of street virus Bucarest II Tangier IV and Tangier III did not behave identically. The strain Bucarest II gave rise to the largest number of Negri bodies in the brain and also in the corneal epithelium. Oxyphil bodies were more numerous in the cornea which had been the focus of infection than in that of the other eye but on the other hand the virulence of the non inoculated cornea seemed to be the higher. There appears to be no direct or constant correlation between the concentration of Negri bodies in a cornea, and its virulence.

In a third paper¹³ these authors compare the evolution of the rabies virus with that of the vaccinal virus (Guarnieri bodies) in the cornea epithelium. The main distinction is that whilst the Guarnieri bodies appear only in the cornea which has been infected, in the case of rabies oxyphil corpuscles are often found in the two cornea at the same time. The authors consider that this proves that the vaccine virus remains local whilst the virus of rabies first invades the central nervous system and then travels along the 5th nerve to the cornea centrifugally.

In an article of 29 pages SHORTT¹⁴ discusses the question of nature of the Negri body. After a résumé of the literature on the subject he describes fully the appearances which he has observed in tissues stained by Mann's stain and by iron haematoxylin. The material which he has employed is mainly the brain of the dog and in this he has examined the appearances at all stages of development of the disease. Series of dogs were infected, and individuals were sacrificed at intervals throughout the course of infection. Some correlation was found between number and size of Negri bodies and the duration of clinical symptoms and it appeared that the salivary glands may be infective before the onset of symptoms. The location size and shape of the Negri bodies are then described, with numerous illustrations. Their internal structure is then dealt with. In a final discussion the author finds no evidence that the bodies are the products of nuclear or nucleolar degeneration. The theory that they are parasitic protozoa "while it cannot be dismissed has no indubitable facts to support it".

¹³ LEVADITI (C.) & SCHORR (R.). Les corpuscules oxyphiles contenus en rapport avec les diverses souches de virus rabique des rues.—*C R Soc Biol* 1935 Vol. 119 No 20 pp 463-496

¹⁴ SHORTT (C.). Evolution du virus vaccinal et du virus rabique des rues dans l'épithélium corneen.—*C R Soc Biol* 1935 Vol. 119 No 22 pp 708-709 With 4 figs.

¹⁵ SCHAFFER (H. E.). Morphological Studies on Rabies. Part II. Negri Bodies in the Hippocampus major in Street Virus Infections.—*Indian Jl Med Res* 1935 Oct. Vol. 23 No 2. pp. 407-436 With 58 figs. on 3 plates & 1 text fig [34 refs.]

The theory that the bodies are the cell inclusions of a virus disease remains in the author's judgment unproven. The structure of the bodies is uniform, and "is the same in whatever animal it is studied, and the bodies have all the morphological characteristics of organized entities rather than those of mere agglomerations of elementary bodies such as the orthodox inclusion bodies are presumed to be." As none of the usual theories appears to have been established the author submits for consideration that on morphological grounds alone, the possibility should be considered that the Negri body is a vegetable organism structurally most closely approaching the yeasts." The author has kindly furnished us with sections showing the appearances which he describes.

RAMOS Y CAJAL and GRACIA (Trabajos del Laborat. de Investig. Vol. 3 1904) showed that in rabies (both fixed and street) the neurofibrils of the nerve cells are hypertrophied and fuse to form filaments. These observations are confirmed by MAROCFLAY,¹³ who considers that these appearances are indications of degeneration. The neurofibrils increase and fuse until finally they coalesce into homogeneous masses.

In an article of over 30 pages LOTREKIN¹⁴ summarizes our knowledge regarding the pseudorabies of AUJESZKY. A report is also included of the discussion on the subject at the 9th session of the "Oeuvre internationale des Epizooties," Paris (1935), at which a resolution affirming the necessity for the collection of further information regarding the disease and for further experimentation on the action of the virus was passed.

It appears that pseudorabies can be communicated by dropping 0.2 cc. of a 1 in 50 emulsion of fresh brain substance from a rabbit dead of the disease onto the external ear. The interest of the observation of ROMULUSCEK and BANÍK¹⁵ is that this is an ectodermal route similar to that of the skin.

The mode of transmission of AUJESZKY's pseudorabies has been the subject of much recent discussion. GRACIAS and SCHWARTZ¹⁶ now report that they have observed "a spontaneous transference of the disease from a sick animal to a healthy unwounded animal, that the disease can be communicated by the bite and that the saliva of a sick cow was infective to rabbits and guinea-pigs (cf. KOTLINSKI and BANÍK this Bulletin 1933 Vol. 30 p. 578). The disease is described as it occurs in the dog, cat, horse in cattle, pigs, rabbits, mice and guinea-pigs. The differential diagnosis from rabies is difficult. Negri bodies indicate rabies but they are not always found. A clinical diagnosis is, according to the authors, not possible. A second communication will deal with serological reactions and crossed immunity tests.

¹³ MAROCFLAY (J.). Altérités majeures du réseau neurofibrillaire dans la rage. Dépigmentation neuro-hyaline des cellules nerveuses des ganglions cérébro-sacrés.—C. R. Soc. Biol. 1935 Vol. 119 No. 25 pp. 1021-1023. With 4 figs.

¹⁴ LOTREKIN (L. F. D. E.). Ziekte van AUJESZKY.—Tijdschr v. Diergeneesk. 1935 Sept. 1 & 15. Vol. 62 Nos. 17 & 18. pp. 813-822 919-921. (Part II of article.) English summary.

¹⁵ ROMULUSCEK (P.) & BANÍK (J.). Transmission de la maladie d'Aujeszky au lapin par voie exocutaire.—C. R. Soc. Biol. 1933 Vol. 119 No. 4 pp. 937-939.

¹⁶ GERRICK (F.) & SCHWARTZ (F.). Experimentelle Untersuchungen über die Aujeszky'sche Krankheit (Pseudorabies). I. Mitteilung.—Riv. Ital. di Pat. Trop. 1933 Nov. 8. Vol. 43. No. 45. pp. 1379-1382.

The mode of transmission of pseudorabies in cattle is also discussed by SHOPE.¹⁹ There is no evidence, he says, that the disease is contagious or that ectoparasites play a part in transmitting the causative virus. The morbidity rate in herds does not usually exceed 10 per cent. Experiments with pseudorabies in swine have supplied information suggesting that the disease in this species may be of epidemiological importance in the spread of the infection to cattle. In the pig the disease is relatively mild but highly contagious. The nose serves both as an entrance and as an exit for the virus. Contact between the abraded skin of rabbits and the nose of infected swine induces infection. In certain cases which SHOPE has examined it is believed that swine which harboured a mild and unrecognized pseudorabies infection transmitted the disease to the cattle with which they were associated, by the transfer of the virus on their noses to the abraded skin of the cattle.

In a second section of this communication SHOPE shows by examination of the blood sera, that the disease is highly prevalent in middle western hogs. Rats may also play a part. When infected they rapidly develop a fatal infection. They may serve as the initial source of infection of a herd of swine and also as one means by which the virus can be spread from farm to farm.

b Symptomatology and Diagnosis

IYENGAR²⁰ reports a case in which the incubation period is stated to be 1 180 days. He believes that the possibility of a fresh infection during the interval has been excluded.

An interesting case is described by GENEVRAY and DODERO.²¹ A pregnant woman showing symptoms of rabies was submitted to a Caesarean operation, and died of typical rabies some hours after. The diagnosis of rabies was confirmed histologically and by animal experiment. The child remains well and is 13 months old. It would thus appear that the virus had not traversed the placenta, or if so in too small quantity to transmit the disease. The serum of the child was tested at the age of 8 months and no rabicidal substances were demonstrable.

LAFINE²² recommends for the staining of Negri bodies a mixture of two solutions. A 1 gm. basic fuchsin in 200 cc. of 50 per cent. alcohol B an aqueous solution of safranine 1 per cent. Paraffin sections after treatment with xylol and alcohol are stained for 10 minutes with equal parts of the above solutions. They are decolourized

¹⁹ SHOPE (Richard E.) Experiments on the Epidemiology of Pseudorabies. I Mode of Transmission of the Disease in Swine and their Possible Role in its Spread to Cattle. II Prevalence of the Disease among Middle Western Swine and the Possible Role of Rats in Herd-to-Herd Infections.—*J. Experim. Med.* 1935 July 1 Vol. 62 No 1 pp 85-99 [15 refs.] 101-117 [10 refs.]

²⁰ IYENGAR (K. R. K.) A Case of Hydrophobia with the Longest Incubation Period on Record.—*Indian Med. Gaz.* 1935 Oct. Vol. 70 No 10 p. 582.

²¹ GENEVRAY (J) & DODERO (J) Note sur un enfant né d'une mère en état de rage.—*Ann. Inst. Pasteur* 1935 July Vol. 55 No 1 pp 124-127 [14 refs.]

²² LAFINE (P.) Méthode de coloration histologique du nerf pour l'étude cytologique de la rage et des maladies à virus (inclusions nucléaires et inclusions protoplasmiques).—*C. R. Soc. Biol.* 1935 Vol. 119 No 23 pp. 804-805

in alcohol acetone and washed, then coloured for ½ to 1 minute with Stévenel's permanganate blue solution, undiluted (*Bull. Soc. Path. Exot.*, 1918, Vol. 11 p. 870) washed in running water to eliminate excess of blue, again destained in alcohol acetone, then dehydrated in 95 per cent. alcohol xylol balsam. The tissues in relation to inclusions in general are coloured as follows. Stroma pale rose, neuroglia and leucocytes violet neurones blue, chromatin purple, nuclei bright red, nuclear inclusions and oxyphil substances bright rose Negri bodies rose-mauve, internal structures blue.

This method of staining has been compared with that of Giemsa by NICOLAU and BAFFET²². In a series of four experiments the numbers of Negri bodies found in sections stained by Lépine's method were 2.4 3.6 4.3 and 5.7 times as great as those found in sections stained by Giemsa.

A rapid method for demonstrating Negri bodies in urgent cases is given by FAYER.²³ Small pieces of hippocampus ¼ th inch thick in hot (60°C.) formal saline for 15 minutes. Dehydrate in abs. alc. 10 minutes, then in a mixture of acetone and ether (equal parts) for 10 minutes. Clear in cedar wood oil at 60°C. Two changes paraffin wax, 10 minutes in each at 60°C. embed and cut. Mount on albumized slides, fix gently over the Bunsen flame. Remove paraffin with xylol, then alc. wash carefully in aq. dest. Pour on equal parts of hot 1 per cent. aqueous methylene blue and 1 per cent. eosin for about 15 minutes according to thickness of section. Wash with aq. dist., flood section for 10 seconds with formalin (40 per cent) wash with water. Differentiate with alkaline alcohol (30 cc. abs. alc. with 8 drops of 1 per cent. sod. hyd.) rapid alcohol till blue, clear with xylol and mount. Negri bodies stain red. The whole process can usually be completed in 1½ to 2 hours. Naturally histological detail is not good, but Negri bodies are well defined, and stand out prominently.

III. Pathology

The lesions of the neurones in fixed virus rabies have been studied by LÉPINE and SAUTTER.²⁴ (1) Negri bodies are rarely found, and if present are very small and have no inner structure. (2) Vacular lesions in the form of hyperchromatic corpuscles, round or oval, more or less numerous in the same cell, appear in the interior of a uniformly oxyphil nucleus from which all traces of chromatin have disappeared. (3) Fine intra-protoplasmic inclusions granular or elongated of the type described by MAXOUTEVIAN are frequently seen. These effects are seen in sections stained by Lépine's method.

IV. Methods of Treatment and Statistics.

For the last six years a standard method of antirabid treatment has been employed at the institutes of Yugoslavia. The phenol-ether vaccine of Hempf is used. The results of this experience are the

²² NICOLAU (S.) & BAFFET (O.). La coloration de Kypke dans la recherche des corps de Negri.—*C. R. Soc. Biol.* 1933, Vol. 120, No. 31 pp. 319-321.

²³ FAYER (S. V.). A Rapid Method of Diagnosis of Rabies in Urgent Cases.—*West African Med. J.* 1934 Oct. Vol. 8, No. 2 pp. 15-16.

²⁴ LÉPINE (P.) & SAUTTER (V.). Sur les malades spécifiques des neurones dans la rage à virus fixe.—*C. R. Soc. Biol.* 1933, Vol. 119, No. 21, pp. 805-807.

subject of a comprehensive article by NIKOLIC²⁵ superintendent of the institute at Novi Sad. In the first place the technique of preparation of the vaccine is described, and adequately illustrated. The apparatus for filling capsules in such a manner that both sedimentation and frothing of the emulsion are avoided is particularly interesting and should be studied by those who are concerned with the distribution of vaccine on a large scale. The second section is statistical. It relates precisely to the same set of statistics as has been classified in my reviews for the League of Nations under the heading killed ether vaccines and which have already been referred to in these reviews. The extraordinary immunity of persons bitten on the leg in Jugoslavia (no deaths amongst 8,869 persons bitten) is passed without remark. An interesting series of rabbit experiments in which treatment by Hempt's method is compared with no treatment yields the following result. Of 346 rabbits which received a preinfectious treatment of 10-25 cc. of vaccine over a period of from 3-4 days 99 died from intercurrent disease, 19 of rabies and 228 survived (*i.e.* percentage of survivors 92.4 and of those dead of rabies 7.6) whereas of 96 controls 12 died otherwise 73 of rabies and 11 survived (*i.e.* percent ages of 13.1 and 86.9 per cent. for survivors and those dead of rabies respectively). The result of postinfectious treatment was as was to be expected, not so satisfactory. Of 40 treated from 6-21 days with 1.5 gm. of brain substance 32 died of rabies (*i.e.* 80 per cent.) whilst of 14 controls 2 died of intercurrent disease and 12 of rabies (*i.e.* 100 per cent.). The same success was observed in animals treated by dilutions according to the method of Högyes. NIKOLIC rightly ascribes the failure of post infectious immunization experiments to the shortness of the incubation period in experimental rabies.

An interesting set of figures illustrated by a graph shows the effect of treatment upon the incubation period in human cases. Of 62 fatal cases treated during the period 1927-1934 49 (79 per cent.) had incubation periods of under 40 days and 13 (20.9 per cent.) incubations of over 40 days. Of 53 untreated persons who died during the same period, exact information was available in the case of 28 of them. Of these latter 4 (14.2 per cent.) incubated in less than 40 days, whilst 24 (85.8 per cent.) had incubations of over 40 days. This result is interesting in relation to VAN STOCKUM's figures (this Bulletin 1935 Vol. 32, pp 612-616). The author then goes on to discuss 4 cases of post vaccinal paralysis which occurred amongst the 53,780 persons treated during the six years. The whole question of the causation of accidents is discussed and the author stresses the possibility of another neurotropic virus being transmitted to the bitten person through the scratch or bite. Finally the question of decentralization of treatment is discussed.

The effect of preinfectious treatment by powerful antirabic sera upon the development of the disease in mice has been studied by HORR FISK and MOORE.²⁶ The sera had a titre of 1/256 and the

²⁵ NIKOLIC (Milan) Ueber die Resultate der Dezentralisation der Tollwutbekämpfung in Jugoslawien. Auf Grund 8 jähriger Erfahrungen mit der verwendbaren phenoxylierten Aethervakzine und der abgekürzten Impfmethode nach Hempt.—*Vel. Arhiv.* 1935 Vol. 5 Nos. 6 & 7 pp 247-288 289-320 With 5 figs. [30 refs.]

²⁶ HORR (Anson) FISK (Roy T.) & MOORE (Frederick J.) Experimental Rabies in White Mice. Studies on Passive Immunization I.—*Proc. Soc. Experim. Biol. & Med.* 1935 June. Vol. 32. No 9 pp 1580-1581

infecting dose was 0.2 cc. of a filtered emulsion. The sera were injected intraperitoneally from 48 to 1 hour before administration of the test dose. Control mice were given normal serum. It was found that a higher number of treated mice (39 per cent.) survived than of the corresponding controls (12 per cent.). A longer mean incubation period was shown by the treated than by the untreated. The number of mice in the treated group was 155 and in the untreated it was 196. It is stated that the data have been submitted to a careful statistical analysis by Dr Thurston H. Ross but no details are given.

The statistics of the Pasteur Institute at Paris for the year 1934 are published by VIALA.²² 496 persons were treated, none developed rabies and no paralytic sequelae were observed. The strain of fixed virus employed is that which has been in use since 1888. The number of the passage is not given. The mortality during the 33 years up to 1921 ranged from 0.20 to 0.35 per cent. Since 1922 (except for one case in 1924) it has been 0 per cent. It is pointed out that in 1921 the maximum duration of desiccation of cords was reduced from 10 to 5 days and again in 1935 to 4 days. "Is this a relation of cause and effect? The future will show."

A report on rabies in Cuba is presented by AREMAS MARTORELL and HERRADA LIBRE.²³ The number of human cases is not great, and shows a general decline from 10 in 1925 to 3 in 1933. During the period 1st September 1927 to 15th June 1931, 2,788 animals brains were examined, of these 484 showed evidence of rabies. Measures of control by immunization of dogs and by destroying stray animals are in force and figures are given relating to the various districts.

v. Rabies in Animals.

An interesting report on the prevalence of Rabies in New York City and on the methods of control is presented by OLESEN.²⁴ The report is a long one and worthy of study—only a few of its most interesting features can be mentioned here. A curve is given showing the number of rabid animals encountered in each year from 1908 to 1934. A period of high mortality (100–250) existed from 1911 to 1915, and a second (100–160) from 1928 to 1930. In the intervals, rabid animals were infrequent (50 and under). There appears to be no correlation between the number of rabid animals and the number of "animal bites," the numbers of the latter have increased more or less steadily throughout. The statistics of these "animal bites" are fully treated, but as these are not apparently related to rabbits they need not be considered here. The author concludes from his data that education of the public is as important as—if not more important than—regulation.

vi. Post Iaccinal Paralysis.

When during the course of treatment or shortly after it, a person dies from a paralytic accident, and it is found that his brain causes a rabbit to die with the incubation of fixed virus rabies, there can be no

²² VIALA (Jules). Les vaccinations antirabiques à l'Institut Pasteur en 1934—*Ann. Inst. Pasteur* 1935 Junc. Vol. 54 No. 6 pp. 764–769.

²³ AREMAS MARTORELL (Rogelio) & HERRADA LIBRE (Mauricio). Estado actual de la rabia en Cuba.—*Rev. Period. Cien. y Let. Habana* 1933 Sept.–Oct. Vol. 1 No. 1 pp. 22–31. With 1 chart.

²⁴ OLESEN (Robert). Control of Rabies in New York City.—*Public Health Rep.* 1936 Aug. 16. Vol. 50. No. 33 pp. 1087–1108. With 3 figs. [12 refs.]

doubt that the case is one of *rage de laboratoire*. When however a person dies with precisely the same symptoms as above but the animal test fails is this a case of *rage de laboratoire*? REMLINGER²¹ quotes a number of cases of the first type treated by various methods in which living virus was employed. He points out that the number of cases of *rage de laboratoire* reported is much lower than the actual. In cases which have left the institute and returned home the practitioner may be able to diagnose a Landry's paralysis but he rarely proceeds to animal inoculation. Again the virulence may be low and the inoculated animal may escape. The symptoms of *rage de laboratoire* are those of acute myelitis particularly of ascending type and of bulbar paralysis. The author describes these in full. He also discusses the experimental diagnosis. Generally speaking the absence of Negri bodies in the horn of Ammon (though not in the oculo-motor nucleus) is indicative of fixed virus rabies as also is the presence of Babes nodules. It is only exceptionally that there is any difficulty in differentiating post mortem between street and fixed virus. The author concludes that in general the accidents of antirabic treatment, with the exception of some cases of paralysis after the use of dead vaccines are largely due to fixed virus even if they terminate in recovery or if the result of the inoculation test is negative. This article should be read in full by those concerned with the treatment of rabies.

REMLINGER and BAUILL²² have had occasion to examine a strain of fixed virus from an institute at which paralytic accidents have been observed. It was found to differ in many respects from the classic fixed virus. Comparison was made with the Tangier strain. The virus in question gave exclusively paralytic symptoms incubated in 5 days in the rabbit, and death followed about the 8th day. In dogs symptoms were exclusively paralytic. No Negri bodies were found in the horn of Ammon nor in the oculomotor nucleus. In these respects the two strains were similar. But as regards desiccation resistance to glycerine, and to ether considerable differences appeared. The virus under investigation remained invariably virulent up to 17 days and lost virulence only about the 18th day of desiccation (as compared with about 1 day with the Tangier strain). It remained virulent after 44 days in glycerine (as compared with 8 to 10 days with the Tangier strain). It remained virulent in ether up to 280 hours whilst the Tangier strain had lost virulence in 215 hours. The virus in question originally emanated from the Pasteur Institute in Paris. How bad the change occurred? Whatever be the explanation the necessity for periodical examination of the fixed virus strains employed at Pasteur Institutes is indicated.

vii. Miscellaneous

A special number of the *Annales de l'Institut Pasteur*²³ commemorates the 50th anniversary of the first inoculation of man with an antirabic vaccine. The debt that humanity owes to Pasteur is recognized by all, and we would take this opportunity of offering our homage to the great master who opened a new chapter in the evolution of medicine.

²¹ REMLINGER (P.) Le rage de laboratoire.—*Bull Acad Med* 1935 June 11 99th Year 3rd Ser Vol. 113 No. 22 pp 836-849 [Refa. in foot note]

²² REMLINGER (P.) & BAUILL (J.) Virus rabique de passage à propriétés anormales.—*C. R. Soc Biol* 1935 Vol. 119 No. 23 pp 799-801

²³ ANNALES DE L'INSTITUT PASTEUR. Supplément Numéro commémoratif sur la rage. Publié le 25 octobre 1935—228 pp With numerous illustrations.

by his discoveries regarding immunity and immunization. The volume consists largely of a series of articles on subjects of immediate interest. The first on *rage de laboratoire* covers the same ground as the article by REMlinger and already reviewed (see above). The second by LINDNER and SCHOTZ is a monograph in which their results regarding corneal inclusions in rabies are collected. In the third chapter MAXOUTELIAK gives a résumé of his views regarding the infectivity of the saliva. NICOLAU and KORCZOWSKA recapitulate their observations on the reconversion of fixed virus into street virus. LIRIET, CATTEAU RIER and SATTIER discuss the properties of the Paris strain of foot virus now in its 1,540th passage. GUERRAZ and MAURELLI describe similarly the strain (ex Paris 1885) in use at Lille. In a further article REMLINGER and BAILLY collect and discuss information regarding the alterations in the resistance of fixed virus strains to physical and chemical agencies, which occur during the course of sub-passage. PLAXITREUX gives a short paper on prophylactic vaccination of dogs. ROMEXSKI describes an investigation in which he found that in experimental rabies the sodium content of the brain diminishes whilst the calcium increases. BOZÉ describes the method of heated vaccine combined with dried cords, employed at Cluj and gives some statistics. During the years 1923-1932 of 15,955 persons treated 53 (0.36 per cent) have died of rabies. The results of treatment at Marseilles are given by LIVOT, CATTEAU RIER, NICOLAU and KORCZOWSKA show that Pasteurian treatment increases the agglutinins against Eberth's bacillus and increases the concentration of haemolysins generally. Finally HACCIENAU, CRUVEILHIER and NICOLAU discuss the effects of antirabic treatment upon other diseases. It has no effect on lameness or vertebral rheumatism. 9 cases of sympathetic pain were unaffected, as also were two of trigeminal neuralgia. On the other hand 6 out of 7 cases of sciatica were completely cured and 1 case of migraine seemed to respond.

The Pasteur Institute at Tunis²⁴ celebrated on the 6th of July 1925, the 50th anniversary of the first application of antirabic treatment by Louis Pasteur. A message from NICOLLE was read.

An epileptic bitten by a dog was given a course of antirabic treatment by Hempt's method. His epileptic symptoms disappeared and he is now cheerful, fresh, and able to work. NICOLLE²⁵ was constrained to test his method of treatment in the case of other epilepsy. It may be remembered that BAKLA-SZABÓ (Wien. Klin. Woch. 1933 Vol. 43, p. 81) had used Högger dilution method for cases of polyconvulsions. The point about Hempt's vaccine is that it contains no living virus. According to NICOLLE it appears that the treatment of epilepsy with killed antirabic vaccines (such as Hempt's) can be used with hope of success in all forms of epilepsy except those which are traumatic or tuberculous. No evidence in favour of this conclusion is cited.

A Summary of Rabies in general is presented by GUERRAZ and HASTINCA.²⁶ This is followed by a discussion in which much interesting light is thrown on the conditions under which it prevails in the Southern States of America.

A. G. McKENZIE

²⁴ Archives de l'Institut Pasteur de Tunis. 1925. Jour. Vol. 34, Nos. 3 & 4 pp. 622-523 — Cinquantaine anniversaire de la vaccination anti-rabique.

²⁵ NICOLLE (Dinan). Behandlung der Epilepsie mit antirabischer Vaccination — Monatsschr. Med. Fisch. 1933. Sept. 13. Vol. 82. No. 37. pp. 1480-1494.

²⁶ GUERRAZ (William B.) & HASTINCA (Gordon). The Problem of Rabies — Southern Med. Jl. 1925. Oct. Vol. 28. No. 10. pp. 804-808. [11 refs.]

REVIEWS AND NOTICES

LOEPER (Maurice) & collaborators. *Thérapeutique médicale. IX. Malades Infectieuses et parasitaires.* [Medical Treatment. IX Infective and Parasitic Diseases.]—415 pp 1935 Paris VI Masson et Cie 120 Boulevard Saint-Germain. [50 fr]

This work deals almost entirely with essentials and principles that is it does not go too much into detail. Such would require a system of treatment in several volumes part of which at least would soon be out of date. The present volume therefore has a more permanent value. It is divided into two main parts the first which comprises two-fifths of the whole deals with General Therapeutics and is the work of one man Professor R TURPIN whereas the eleven chapters of part II on Special Therapeutics are contributed each by a separate author a recognized specialist in his own domain

In part I Professor TURPIN deals first with treatment by Vaccination. In this, as is natural BCG receives more credit than it holds at present in British eyes. The author speaks of naturally and artificially attenuated viruses the use of anatoxins general technique and results of injection. In this and other chapters of the section the historical introductions are of great interest Chapter II deals with Serum Therapy its applications results and accidents. Bacteriotherapy follows—the principles of vaccine treatment by homologous and heterologous organisms. The chapter on Chemotherapy is too short. It is not possible to consider adequately in 23 pages the principles of chemotherapy the various dyes arsenicals, antimonials and mercurials but so far as it can accomplish this the work is well up to date and includes plasmoquine and even atebrin. The inequality in treatment of subjects is exemplified by the fact that the chapter on protein shock and protein therapy is given even more space than that on chemotherapy. The final chapter of this part is devoted to Haemotherapy

Part II Special Therapeutics starts with a short chapter by Professor TANON on Disinfection in Infective Diseases. Surgeon-General DOPTER whose name is well known to readers of this *Bulletin* and the *Bulletin of Hygiene* deals with the dysenteries the serum treatment of bacillary dysentery and its results and vaccine treatment in amoebic dysentery the uses risks and results of emetine of arsenicals in various forms—novarsenobenzol stovarsol treparsol, acetylarsan and sanjuol—by yatren etc. passing on to the modes of dealing with primary attacks, with relapses and with the disease as it affects children. Ensuing chapters deal with tetanus influenza and the brumth treatment of syphilis by Drs. L BAZY R Dujarric DE LA RIVIÈRE and Professor LEVADITI respectively All give a good summary of present day knowledge of their subjects.

Professor ABEAU is entrusted with General Principles of the Treatment of Paludism—a short chapter of nine pages necessarily therefore a mere sketch—and he does not touch on prophylaxis. Anti-typhoid vaccination is adequately considered by Professor LEMERRE and Professor DEBRÉ gives a good general account of diphtheria, paying due homage to the work of RAMON SCHMIDT GLENNY and others whose names are household words in this regard. Vaccine and Serum Therapy of Virus Diseases is divided into three viz rabies poliomyelitis and yellow fever. For some reason not readily understood more than half the space given to the second of these deals with Weil's

disease and *S. p. microtachomorrhagiae*. The two final chapters, on the use of convalescent serum in the acute infective diseases, and the use of vitamins especially vitamin A in infections, do not call for special comment both are still *sub judice*

H. H. S.

SHELLEY (Horace M.) [F.R.F.P.S. M.R.C.S., L.R.C.P., D.T.M. & H. (Eng.) Government Pathologist, Vyaaland, East Africa]. *An Epitome of the Laboratory Diagnosis and Treatment of Tropical Diseases*.—pp. xii+81. With 14 figs. Pocket Monographs on Practical Medicine. 1936. London John Hale, Sons & Dunchison Ltd. 83-87 Great Titchfield Street, W.1. [2s. 6d.]

This is a good little book and will doubtless prove of service to the tropical practitioner who has only a small laboratory at his disposal. The character of laboratory referred to will be seen from the list of "articles and reagents required," given in section 1 of the book. An astonishing amount of useful methods and procedures and hints for carrying out laboratory examinations and indications for treatment is given and all in four score pages. The following remarks are made, not in any carping spirit but as suggestions for a future edition, which is almost certain to be called for soon.

The equipment mentioned includes a haemoglobinometer. It seems a pity therefore to give the Takquest method, and that only for estimating haemoglobin, without any warning as to the large errors it may entail. The easy method of estimating the colour index by use of the formula $\frac{H}{2E}$ ($H = \text{Hb}$ percentage E the first two figures of the erythrocyte count) might be given. Unless the denominator 256 (p. 7) in estimating leucocytes is explained as the number of small squares counted it seems a mere arbitrary figure.

Antimake venoci [meaning snake antivenom] is mentioned in treatment of the haemolysis of blackwater fever but not the kind nor the dose and hence will not be very helpful to the worried practitioner. It is not the general experience to find the sprochaetes of infective jaundice in the urine during the first three or four days of the disease. It is rarely seen there before the tenth day. Under this mention might be made of a ready method of obtaining fluid free from blood for examining for sprochaetes, viz. touching the ulcer edge with a pledget of cotton wool dipped in alcohol, the serum will ooze up and often show an abundance of organisms. The diagnosis of melioidosis is not greatly facilitated by the statement that "the organism may be discovered in smears of the sputum and "the patient's blood serum agglutinates an emulsion of the organism." when nothing is said as to the characters, appearance or even name of the organism.

In the diagnosis of yellow fever we find the peculiar statement "albumin appears in the urine on the second day and increases in amount daily until it finally disappears." The last sentence is self-contradictory. Mention should be made of taking a blood sample of possible yellow fever patients after recovery and sending it to a laboratory for the protection test or in suspected fatal cases a portion of the liver for histological examination. In dengue or any other fever 5,000 leucocytes per cmm. would not be a "marked leucopenia," 1,500-2,000 would be nearer the number.

No indication is given that Oroya fever is merely the generalized form of verruga peruana and that the two are really different aspects of

the one disease. In sprue it is very unusual to find absence of free HCl from the gastric juice especially if the histamine test be made and in dealing with treatment something should have been said of Fairley's high protein low fat low carbohydrate régime which has met with such success. No means of diagnosing climatic bubo (Lymphogranuloma inguinale) is given. Frei's test receives no mention.

Periodide (p. 74) is one word—there are periodides of several alkaloids and in this case merely implies the interaction of emetine and iodine in certain proportions so that the final product contains 6 atoms of iodine.

Surely nobody unless he had money to waste would dream of preparing alcohol strengths from absolute alcohol. Absolute alcohol (or as near to absolute as is obtainable) costs about double the 90 per cent. and all dilutions needed can easily be made from this accurately by Gay Lussac's table or in round figures by the scale found in most laboratories.

Lastly misprints are few. Schüffner (p. 2) has a modified u and similar dots may be seen in quartan parasites in prolonged staining. Schaudinn (p. 34) has two n's and 10 lines from the end of that page is a misprint. Sir Leonard Rogers is a host in himself and has a plural name. Ascanole (not ascanadol) is the active principle of oil of chenopodium. In a future edition room might be found for the wrinkle of dipping stained blood slides in paraffin to preserve the colour for future examination and for the general method of making up any solution of a desired strength from one of greater concentration without waste of material or the need for keeping several strengths. The page of diagrams of helminthic ova would be more serviceable if drawn to scale.

There is so much that is good in this book that the foregoing suggestions have been put forward for consideration of the author who may see fit to adopt some of them in future editions. There is no question that the work was well worth the undertaking and that many tropical practitioners will be grateful to Dr Shelley for it and to the publishers for producing the book in so handy a form at a price so absurdly low.

H. H. S.

VILLAIN (Georges) [Médecin Inspecteur de l'Hygiène Publique à la Direction Générale de l'Intérieur à Tunis]. Guide pratique d'examen microscopique du sang appliquée au diagnostic du paludisme. Suivi de Technique, indications et résultats de la mélano-flocculation par A. F. X. HENRY [The Diagnosis of Malaria by Microscopical Examination of Blood].—93 pp. With 5 figs. 1 chart & 7 coloured plates. [Supplément à la Biologie Médicale 1935.]

This Supplement to Biologie Médicale 1935 aims at providing the worker who is deprived of the facilities of a modern medical library, with a practical handbook to enable him to profit from use of his microscope which is indispensable in the diagnosis of malaria. The final sections are devoted to indications for use of the Melano-Flocculation test, its technique and interpretation.

Notes on the making and staining of thin and thick blood films are essentially practical but are almost too brief in regard to the latter.

A general and differential description of the three chief malarial parasites with the associated blood changes is followed by corresponding notes on *Pl. ovale*.

Appreciation of the changes to be found in the blood cells is assisted by a section on normal and abnormal blood cells.

Note is made of other blood parasites which may be encountered, and some of the appearances which may simulate malarial parasites are explained.

A full page coloured plate is devoted to each of the four types of malarial parasites and a fifth to thick film preparations. Two other plates illustrate blood cells and *Leishmania* and *Sprochectes* which are met in N. Africa.

An evening's careful study of this handbook should enable a man, who knows how to use his microscope but who is inexperienced in malaria, to prepare and stain a satisfactory blood film, and to form from it an opinion in regard to malaria. He will also be stimulated to search for further information on the interpretation of his findings from the larger text books which deal with protozoology and with malaria as a disease.

P. H. Metz.

- i. PAVLOVSKY (E. N.) Textbook of Human Parasitology—522 pp. With 3 plates & 381 text figs. 1934. Leningrad. (State Publishers of Biological and Medical Literature.) [In Russian.] [Roubles 9-20.]
- ii. PAVLOVSKY (E. N.) [Edited by] and Others. Practical Course of Medical Parasitology—434 pp. With 230 text-figs. 1935. Leningrad. (State Publishers of Biological and Medical Literature.) [In Russian.] [Roubles 6-85.]

The two books under review are based on many years of practical experience in teaching parasitology at the Military Medical Academy in Leningrad under the direction of Prof. Pavlovsky who is one of the pioneers of Russian parasitology. The course is adapted to the needs of medical men and students and biologists in general, and deals mainly with the parasites and vectors encountered in the territory of the Soviet Union. An account is also given of the epidemiology of the various parasitic diseases, while the clinical and therapeutic aspects of these infections are omitted.

i. The theoretical course is divided into two sections, general and special. In the first a summary account is given of parasitism and the general problems of parasitology. The special section includes protozoology, helminthology and arachno-entomology with special reference to the vectors of infection. The description of each parasite comprises its morphology, life cycle, sources of infection, bionomics, pathological effects and prophylaxis. In the case of flies and mosquitoes (*Anopheles*) there are keys for the determination of genera and species respectively. Among the numerous illustrations many are original. In the part devoted to arachno-entomology which is the author's speciality the biology and ecology of insect vectors receives particular attention. This work is the only one of its kind in the Russian language and is of the high standard one usually associates with the author's name. The treatment of the subject throughout is authoritative and stimulating so much so that one regrets that it is inaccessible to the foreign reader.

ii. The "Practical Course" is a companion-volume to the preceding book and covers the same ground, with the addition of an appendix dealing with the poison-organs of various animals. The work is collective, the different sections being written by Prof. Pavlovsky and

a team of specialists. After a description of general laboratory technique an account is given of the method of collecting preserving and dissecting the parasites. The methods of dissection of insects illustrated by original anatomical drawings are of special value. In the case of mosquitoes and some other insects detailed instructions are given for conducting field observations on various stages of the insects. The practical text book is thus a valuable guide to laboratory and field workers of different categories.

C A Hoare

PAVLOVSKY (E. N.) [Edited by] Materials on the Parasitology and Fauna of Southern Tadzhikistan.—The Tadzhik Complex Expedition of 1932 and the People's Commissariat for Health of the Tadzhik S.S. Republic. Fasc. X. Reports of the Expedition.—354 pp. 1935 Leningrad. (Published by the Academy of Sciences of U.S.S.R.) [In Russian]

In 1932 the Academy of Sciences of U.S.S.R. organized a Complex Expedition to Tadzhikistan (Middle Asia) with the object of making a comprehensive survey of all the natural resources of that country. It also included the study of the human inhabitants with special reference to public health. One of the expeditions led by Prof. Pavlovsky of the Military Medical Academy was charged with the parasitological and faunistic investigations the results of which are recorded in this volume.

E. N. PAVLOVSKY (On *Ornithodoros* inhabiting burrows in Tadzhikistan and their relation to the spread of relapsing fever p. 19) demonstrated that *Ornithodoros* in all stages of development were widely distributed in the burrows of tortoises hedgehogs rodents and other animals upon which they fed. It was found that under experimental conditions these ticks do not transmit spirochaetes to guinea-pigs. However *O. papillipes* found in caves in the Caucasus have been known to infect human beings with relapsing fever. The author was also able to demonstrate that the spirochaetes remained viable and virulent in ticks kept in laboratory conditions without food for 4½ years. These facts show that this species (and possibly others) even when found in abandoned dwellings or in natural biotopes are capable of retaining the virus almost indefinitely thus constituting a potential source of infection. In a paper On the effect of the bite of *Ornithodoros* and *Argas* upon the human skin by E. N. PAVLOVSKY and A. K. STEIN (p. 45) a differential diagnosis is given of the dermatological picture obtained in the case of each of the two genera. The paper is illustrated by a coloured plate depicting the various types of papules.

A. HOSRYA (p. 55) deals with the pathology of the comatose form of malaria, based on 42 cases. V. G. FEDOROV (p. 85) writes On the fauna of blood-sucking mosquitoes of the town Stalinabad, while P. PAVLINEV (p. 94) gives a morphological and systematic description of

The sandfly fauna of Middle Asia, together with a key for the identification of females and males respectively. It is pointed out that *Phlebotomus barovskii* Chodukin, 1931 probably represents *P. sergenti* var. *mongolensis*. The incidence and ecology of ticks are dealt with by M. POSPELOVA STRONI in the following papers. On the ticks of wild animals of the Tadzhik S.S. Republic (p. 113) and Contributions to the knowledge of the ticks of domestic animals in Tadzhikistan (p. 135) V. G. FEDOROV (p. 149) provides a list of ectoparasitic arthropods from dogs of Stalinabad. E. N. PAVLOVSKY and A. GLIVICKIJ (p. 155) devote

a paper to "Human beings bitten by the karakurt in the Baumnabud district of Tadjik S.S.R." in which 9 cases are described. The characteristic symptoms of the bite of *Latrodectus tredecimguttatus* are as follows: cyanosis of the face, neck and upper half of the body; oedema of the eye-balls, dilatation of the pupils, dryness of the tongue, slow and irregular pulse, muffled heart sounds, limitation of excursions of the lung, respiratory irregularities, copious perspiration, constipation and retention of urine, muscular tremors and the appearance of albumen in the urine. All these symptoms usually disappear by the fifth day. The site of the bite is represented by a pinkish spot with two red points in the middle.

E. V. PAVLOVSKY (p. 169) further records some "Observations on the domestic inhabitants and poisonous animals in Tadjikistan, treating man and the various animals sharing his dwelling as a basic community with special reference to their epidemiological rôle."

G. G. SHANOV (p. 203) provides Materials for the helminthic fauna of the aboriginal and immigrant population of Tadjikistan—the incidence of worms in the latter category (17.2 per cent.) proved to be twice as high as in the former (8 per cent.). In a paper "Sur la faune des trématodes de Tadjikistan" (p. 219) I. SHANOV (— Simon) gives a description of the trematodes found in various classes of vertebrates. These include two new species *Lyperosoma gordoni* sp. n. from *Coturnix reperiens* (Aves) and *Lecithodendrus rohweri* sp. n. from a bat, *Rhinolophus hippoferus*; the description of which is given in a French summary. The remaining four papers are concerned with the non-parasitic fauna and with the water-supply of the villages.

C. A. HARR.

BUREAU OF HYGIENE AND TROPICAL DISEASES

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[No. 5]

YELLOW FEVER.

- i. JAMES (S P) Renseignements sur la fièvre jaune reçus au cours des six mois finissant le 30 septembre 1935 [Information on Yellow Fever received during the Course of the Six Months ending 30th September, 1935]—*Bull Office Internat. d Hyg. Publique* 1935 Dec. Vol. 27 No 12 pp 2354-2357
- ii. SOREL Le diagnostic histologique rétrospectif de la fièvre jaune dans les colonies françaises. [A Retrospective Histological Diagnosis of Yellow Fever in French Colonies.]—*Ibid* pp 2358-2359
- iii. BABLET (J) Note préliminaire sur le diagnostic histologique de la fièvre jaune. [A Preliminary Note on the Histological Diagnosis of Yellow Fever]—*Ibid* pp 2360-2364 With 2 coloured plates.
- iv. LLOYD (Wray) L'emploi d'un virus cultivé associé à l'immun serum dans la vaccination contre la fièvre jaune. [The Use of Culture Virus together with Immune Serum in Vaccination against Yellow Fever]—*Ibid* pp 2365-2368.
- v. BULLETIN DE L'OFFICE INTERNATIONAL D'HYGIÈNE PUBLIQUE. 1935 Dec. Vol. 27 No 12. pp 2369-2370—Rapport de la commission de la fièvre jaune. [Report of the Yellow Fever Commission.]

1. During the course of 1935 up to the end of September cases of yellow fever have been recorded from Bolivia Brazil and Colombia in South America and from the French Congo Dahomey Ivory Coast, Niger Territory Togo Gambia, Gold Coast, and Sierra Leone, in Equatorial Africa. In South America especially Brazil, there have been epidemics with many deaths but in Africa only sporadic cases have been reported.

With reference to the specificity of the mouse protection test FINDLAY has tested the serum from a case of Congolese Red Fever [see this *Bulletin* 1935 Vol. 32 p 881] and found that it contained no yellow fever antibodies.

The Bathurst epidemic in 1934 although apparently almost entirely limited to Europeans, was accompanied by a general increase in the mortality amongst the native population, and out of 36 young men resident in the town the blood of 16 protected against yellow fever

In the interior of the Colony protection tests have given the following results:—

Localities	Number of persons examined	Number of protection tests positive	Age Groups among which occurred the positive tests
Basse (Upper River Province)	53	10	3-40 years
Georgetown (McCarthy Island)	49	14	4-40
Kerewan (North Bank Province)	33	12	4-40
Bakau (South Bank Province)	45	13	4-40
Brikama (Kombo)	44	13	4-40

Evidence is also presented showing that in Gambia, as in Brazil, there are two types of yellow fever one urban and the other rural, the latter occurring in isolated districts where *Aedes vexans* has not been found and the problem of whether man is the only reservoir of infection is very uncertain. The examination of monkeys and domestic animals near Bathurst has given negative results, but in the forest region of Ashanti on the Gold Coast, the blood of a *Colobus* monkey protected against yellow fever as well as that of one child out of 12 examined. In London 565 persons have now been vaccinated by means of virus and immune serum and preference is given to the use of human immune serum in place of any heterologous serum. The neurotropic virus has been generally used, but in 21 persons cultivated virus has given equally satisfactory results and recently Dr. FINDLAY has used an attenuated viscerotropic strain supplied by Wray Lloyd [see below].

ii. Up to October 1st, 1935 34 specimens of liver from Europeans who had died after febrile periods of less than 10 days had been received from various French Colonies and examined at the Institut Pasteur by Dr. BASLET. Histological evidence of yellow fever was found in specimens from Niger Territory, Ivory Coast, Dahomey and Togo, also from Brazzaville and Pointe Noire, in French Equatorial Africa.

iii. Specimens not larger than 1 cm. cube are fixed in 15 per cent. formalin for 8 days and then transferred to 5 per cent. formalin for transport. Frozen sections of such material can be stained with Schiadiach R or Sudan III and at once show any sign of fatty degeneration. Paraffin sections are stained either with Mallory's phosphotungstic haematoxylin, or Mason's trichrome stain (Haemalum, Eosin and Saffron).

The characteristic features are found to be (1) fatty degeneration of varying intensity accompanied by extensive necrosis of the cellular regions (2) a diffuse leucocytic infiltration, concentrated in peri-vascular masses in the portal cavities (3) the bile ducts and great vessels are unaffected. In addition the author gives a useful discussion of the main features distinguishing yellow fever from other pathological conditions.

iv. The author records experiments, in conjunction with Tammie and Ricoh, in which a viscerotropic strain has been maintained in

tissue culture, containing pieces of mouse embryo for 130 passages during a period of 21 months. Before culturing this strain was invariably fatal to monkeys but during the course of this period it has gradually lost its virulence and from the 45th to 109th passage 17 monkeys inoculated with this culture virus have all survived. On the other hand, its neurotropic properties as tested by intracerebral inoculations into mice do not seem to have altered. This attenuated virus was passaged through a series of 20 *rhesus* monkeys and the 5th, 6th and 20th animals died of yellow fever the others showing at the most a slight febrile reaction. From the 20th to the 28th passage, however there was a definite return to the original virulence.

Twenty persons have been successfully immunized by the injection of known quantities of this cultivated virus together with quantities of human immune serum ranging from 0.5 cc. to 0.6 cc. per kilo body weight. Only three had any fever (37.7°C.) four others showed a slight rise in temperature of half a degree or less and the remaining 13 no reaction whatever. The blood of five of these subjects was tested 14 to 28 days after vaccination and all showed the presence of yellow fever antibodies in titres ranging from 1/8 to 1/128.

After referring to some of the investigations mentioned above the Commission recommends the adoption of certain measures to prevent the possibility of the infection being carried by aircraft, and the transformation of existing aerodromes not only in Africa but also at Karachi, India, into anti yellow fever aerodromes. *E. Hindle.*

SAWYER (W. A.) & WETTMAN (Loring) The Yellow Fever Immunity Survey of North, East and South Africa.—*Trans Roy Soc Trop Med & Hyg* 1936 Jan. 25 Vol. 29 No 4 pp 397-412. With 2 maps. [12 refs.]

This valuable paper completes the general survey of the continent started early in 1931 by the International Health Division of the Rockefeller Foundation with the co-operation of the governments concerned, and in addition contains a brief summary of the results obtained in previous reports.

It is only possible to give the main conclusions of this paper and for details the original should be consulted. It is shown that in Africa yellow fever in man as determined by blood tests in mice is widely but irregularly distributed in a region extending from the coast of Senegal eastward for approximately 3,300 miles to the upper reaches of the White Nile in the Anglo-Egyptian Sudan. On the north this region is limited by the Sahara Desert. On the west and south the boundary follows the coast of the Atlantic Ocean from Senegal to the extreme north of Angola, then eastward across Angola and the southern part of the Belgian Congo. The region has a maximum width of about 1,400 miles and lies between latitudes 16°N and 6°S.

A few isolated blood specimens with protective serum obtained from individuals outside this region are explained as probably being due (1) to infection as a result of visiting some distant place (2) to sporadic infection with virus introduced into the locality or persisting there under conditions unfavourable to the spread of the infection or (3) to an exceptional concentration of some non-specific factor in the blood.

Within the region of immunity there were areas in which no immunes were discovered others in which only a small proportion of the adults

were immune and still others in which considerable proportions of both adults and children had protective serum. But the whole region must be regarded as endemic, as the disease is always present and widely distributed.

The western area, extending to the eastern border of Nigeria and including the coastal region from Nigeria to Angola, has had numerous epidemics of yellow fever and is still having them. All the historic outbreaks have occurred there, except the two introductions of yellow fever into Morocco in 1804 and 1881 and the yellow fever in coastal towns of Angola up to 1889. In West Africa, the existence of frequent urban and town epidemics in which *Aedes aegypti* is undoubtedly the vector would make it almost impossible to recognize any method of transmission or persistence, other than the common one previously established. In the eastern area, including the remainder of the region of immunity the situation is radically different, for yellow fever has never been recognized except for a single probable case recorded by HEWER in the Anglo-Egyptian Sudan (see this Bulletin 1934 Vol. 51, p. 833). Europeans stationed in places where a large proportion of the natives are immune have never been known to contract the disease, and the heavily immunized areas would seem to be continuously endemic rather than epidemic. It is possible, however, that the immunizing infection may be with strains of lowered virulence, or a selective virulence or a different set of tissues. This is suggested by the extensive alterations occurring in the laboratory and by minor differences in virulence between virus strains from different sources.

Within this eastern area there is an ill-defined zone between latitudes 3°N. and 8°N. giving a high prevalence of immunity among children and adults. There is a diminishing incidence of immunity to the north and south of this zone.

The environmental conditions which favour yellow fever immunization are largely unknown. They may be similar to those responsible in the case of jungle yellow fever in South America, or may be peculiar to Africa. The existence of this zone of high prevalence would seem to offer an excellent opportunity for an intensive study by epidemiologists, pathologists, bacteriologists, entomologists and zoologists to determine (1) the symptomatology and pathology of the disease produced by the immunizing infection (2) the characteristics of the prevailing strain of yellow fever virus, (3) the identities and habits of the blood-sucking arthropod vectors and (4) the presence or absence of warm-blooded animal hosts other than man. Studies along these lines should make it possible to estimate the extent of the danger from yellow fever in Central Africa and the probability of its spread to the eastern coast, and should also help to determine the most suitable precautionary measures.

E. H.

VAN DER BENACHE (Louis). L'immunité amouillée de sérum prélevé chez des ictériques en Uélé (Congo Belge) [Yellow Fever Immunity in Sera from Cases of Jaundice in Uélé (Welle) Belgian Congo].—In *Sera from Cases of Jaundice in Uélé (Welle) Belgian Congo.*—*Ann. Soc. Belge de Med. Trop.* 1935. Dec. 31. Vol. 15. No. 4. pp. 561-568.

A discussion of the problem of yellow fever immunity in the Belgian Congo together with the results of the examination of serum from 62 inhabitants of the Uélé (Welle) District.

The author draws attention to the curious fact that in many districts of the Belgian Congo where yellow fever has never been recognized clinically, the results of protection tests indicate a higher percentage of infection than in many coastal districts where epidemics have occurred.

The existence of fairly numerous cases of febrile jaundice in the Ubangi and Uélé Provinces suggested the possibility of there being yellow fever but serological examinations of these cases showed no higher percentage giving positive protection tests than in the surrounding population. Tests for spirochaetal jaundice were negative and therefore one must assume the existence of epidemics of another type of febrile jaundice. The cases closely resemble those recently described in Nigeria by BEEUWKEES WALCOTT and KUMU [see this Bulletin 1931 Vol. 28 p 858] and also in Colombia by BAUER and KERR,* as well as in various European countries. The aetiology of this disease at present is unknown.

E H

NIGERIA, COLONY AND PROTECTORATE OF REPORT ON THE MEDICAL AND HEALTH SERVICES FOR YEAR 1934 [Yellow Fever p 16]

The Annual Report of the Medical Department of Nigeria contains a brief account of a small outbreak of yellow fever in the Northern Provinces. In November-December 1934 there was a large influx of persons from the northern borders into Katsina and Kano Provinces. Existence of the disease was known at Zinder and elsewhere to the north during the preceding three months and it is possible or even probable that infection was thus imported. No cases were reported in the Southern Provinces suspected cases one at Mamfe and one at Ile not being confirmed. Three Europeans were infected the first on November 21st an administrative officer who had been touring the Gaya district 40 miles east of Kano on the 27th of the same month a Frenchman residing at Ringin 44 miles from Kano (this patient died) on 1st December a resident of Kano.

Immediate steps were taken. The township and Government Station of Nassarawa were declared an infected area. A mosquito survey was made and huts in the neutral zone where breeding of *Aedes* was prevalent were demolished and a careful scrutiny of African fever cases undertaken and 6 suspicious cases were reported. By the protection test 3 were negative 1 doubtful and 2 positive. This is, of course not conclusive evidence that any of them were really cases of the disease. The reduction in mosquitoes was greatly assisted by a severe harmattan during the period in question and this doubtless played a part in limiting the outbreak.

H H S

GAMBIA, COLONY OF THE ANNUAL MEDICAL AND SANITARY REPORT FOR THE YEAR 1934 [BERMINGHAM (H J) Acting Senior Medical Officer] [Yellow Fever pp 55-57 Appendix I]

Dr H. J. BERMINGHAM Acting Senior Medical Officer recorded the reappearance of yellow fever in the Colony during the last quarter of 1934. There were 5 cases in all, two in October one in November and two in December 4 Europeans, 1 African all fatal. The measures adopted on discovery of the first case were More active antimosquito measures evacuation and fumigation of the house where a case

* *Bol Oficina Sanitaria Panamericana*. 1933 July Vol. 12. No 7 pp. 696-716

occurred and those in the immediate neighbourhood examination of Europeans in the vicinity (they were subsequently moved to more healthy areas) issue of warning notices to the public regarding precautions against mosquito-borne diseases enforcement of quarantine. Bathurst was declared an "infected place" in November. Dr J. A. A. DUSCAN Assistant Director of the Health Service Sierra Leone, was called in to assist and an intensive sanitary campaign was inaugurated. House-to-house inspection was undertaken the town was cleaned, eaves and gutters were removed, wells on Government property closed, four bush type incinerators erected, sumps and soakage pits to stand-pipes and ditches and drains holding water were oiled, long grass was cut and burnt, lighters, barges and boats along the foreshore were inspected, unprotected water tanks were oiled, in short an attempt was made to remove all conditions favouring mosquito breeding. Towards the end of December all European officials moved to Cape St. Mary and non-officials were recommended to do the same. None was allowed to return to Bathurst to reside unless protected by inoculation. The sanitation of Bathurst is below a satisfactory standard even after the extra and more intensive efforts. The problem is largely one of drainage and presents considerable difficulties. H. H. S.

BRAUD (1 res). Present-Day Problems of Yellow-Fever Epidemiology—*League of Nations Epidemiol Rep* 1933 July-Sept Vol. 14 No. 7-8 pp. 103-173. With 10 maps. [10 pages of refs] [In parallel French & English.]

An excellent general account of the subject with a series of maps illustrating the distribution of yellow fever and its vectors, and also the results of protection tests and viscerotomy. The author deals especially with the present world distribution of yellow fever its reservoirs and vectors the natural and artificial possibilities of its spreading and methods of preventing any such spread and, finally the methods of control and eventual eradication of infection from areas where it persists in an endemic or endemo-sporadic form.

Although the article contains nothing original it is a useful summary of recent advances in our knowledge of the epidemiology of yellow fever. E. H.

BOONE (C.) Over de afwezigheid van immuniserende stoffen tegenover gele koorts virus in het bloed van bewoners van Java.—[Absence of Yellow Fever Antibody in the Blood of Javans].—*Gesent. Tropisch. v. Nederl. Indië*. 1933. Dec. 24 Vol. 75 No. 26. p. 2183.

The sera of 39 natives of Java and of 10 Chinese were tested for their protective character against neurotropic yellow fever virus in mice. Usually 6 mice were used for each serum. It was found that with native sera one mouse remained alive after test six times and in one instance two mice. With sera of the Chinese, one mouse remained alive three times. These survivals in the experiments have no significance in the interpretation of the results and the conclusion drawn is that yellow fever immune body was not present in the sera tested.

W. F. Harry

FINDLAY (G. M.), STEFANOPOULO (G. J.), DAVEY (T. H.) & MAHAFFY (A. F.). Yellow Fever Immune Bodies in the Blood of African Animals. Preliminary Observations.—*Trans Roy Soc Trop Med & Hyg* 1936. Jan. 25 Vol. 29 No 4 pp 419-424 [11 refs.]

A record of the results of the examination of the blood of 25 apes and monkeys, and 25 other kinds of mammals and birds from Africa in order to determine the presence of yellow fever immune bodies.

The primates examined were obtained in 1934 from the Gold Coast and French Guinea and in 1935 from Bathurst, Gambia and the Belgian Congo and comprised 6 chimpanzees and 19 other monkeys. Seventeen Asiatic monkeys were used as controls and all were negative. Of the African monkeys three were positive a chimpanzee from French Guinea, a baboon from the Belgian Congo and a *Colobus* monkey from the Gold Coast. Human sera protecting against yellow fever have been obtained from the same areas.

The bloods of a number of wild and domestic animals and birds were all negative except those of two sheep from the Gambia one of which protected in a dilution of 1 in 64 the other to 1 in 8. One of six English sheep used as a control also protected in a dilution of 1 in 2 though not when 1 in 4.

These results suggest that in rural as opposed to urban areas monkeys may play some part in maintaining the continued existence of yellow fever. E H

LAIGRET (J.) La vaccination préventive contre la fièvre jaune [Preventive Vaccination against Yellow Fever].—*Rev d'Immunologie* Paris 1935 Mar Vol 1 No 2 pp 113-133

A useful summary giving exact details of the method of yellow fever vaccination advocated by the author and the results of its application in French West Africa.

This method of giving three injections of living mouse virus attenuated by keeping the infected brains at 20°C. for one two and four days respectively has now been applied to thousands of volunteers in various French territories during the past five months and apart from a slight reaction without fever on the 5th to the 8th day or a febrile reaction on the 6th day only two cases have shown any nervous symptoms. Both these recovered and all the other reactions were benign.

In a general discussion of this method the author points out that the results of its application in the field, show that it is unnecessary to accompany the vaccination with a dose of immune serum. In regions where the transmitting mosquito abounded, vaccination has not been followed by any cases of yellow fever and in two regions the Ivory Coast and Niger Territory where the disease existed, vaccination did not result in any recrudescence of the epidemics. The duration of the immunity has now been tested up to three years, but the author recommends that the vaccination should be repeated every two years. E H

LAIGRET (J.) & BONEAU (E.) Longue persistance de l'immunité conférée par la vaccination de la fièvre jaune. [The Long Duration of Immunity produced by Yellow Fever Vaccination].—*C R Acad Sci* 1936. Jan. 13 Vol 202 No 2 pp. 172-175

The authors have tested the immunity of five patients who had been vaccinated against yellow fever by the inoculation of living mouse

virus, at intervals ranging from 8 months to 4 years. One of these patients had been vaccinated by a single dose of "coated" vaccine eight months previously [see this *Bulletin* 1933 Vol. 32, p. 580]. It is stated that in each case there was no diminution in the immunity the serum always containing at least 6,400 protective units per cubic centimetre.

E. H.

MATHIS (C.) DUMONT (C.) & ADVIER (A.) La vaccination anti-amarile comporte-t-elle des dangers dans les régions où la fièvre jaune sévit endémiquement et où les "Stegomyia" abondent? (Deuxième note.) [Is Yellow Fever Vaccination Dangerous in Regions where Yellow Fever is Endemic and where Stegomyia is Common? Second Note.]—*Bull Acad Mal* 1935, Dec. 2, 99th Year 3rd Ser. Vol. 114 No. 39 pp. 510-520.

After a general discussion of the problem an account is given of four experiments in which mosquitoes were fed first on patients that had received six consecutive vaccinating doses amounting to 22 mgm. of infected mouse brain instead of the usual 2 mgm. and subsequently on normal human subjects.

In the first experiment the three natives were inoculated with the above mentioned six doses and whilst undergoing this treatment various batches of mosquitoes *Aedes egypti* were fed on them each day from the 2nd to the 15th day after the treatment had begun. These (156) mosquitoes were fed on a normal subject 14 to 17 days later who was subsequently bitten by a second lot of mosquitoes fed on other vaccinated persons in both cases without producing any signs of yellow fever infection. Four other subjects were exposed to the bites of mosquitoes that had been fed similarly on vaccinated persons, also with negative results.

The authors conclude therefore that there is no danger of yellow fever being transmitted from vaccinated subjects by the bites of mosquitoes.

E. H.

FINDLAY (G. M.) & STEARY (Ruby O.) The Essential Neurotropism of the Yellow Fever Virus.—*Jl. Path. & Bact.* 1935, Nov. Vol. 41, No. 3, pp. 431-438.

An interesting account of experiments showing that the virus of yellow fever possesses an inherent neurotropic capacity even in a species like the *rhesus* monkey which is normally highly susceptible to the ordinary viscerotropic virus.

When this latter type of virus is instilled intravenously into *rhesus* monkeys it produces ordinary yellow fever but in mice gives rise to encephalomyelitis. If a *rhesus* monkey is inoculated intracerebrally with the same virus after a subcutaneous injection of yellow fever immune serum it develops encephalitic symptoms associated with microglial proliferation, perivascular infiltration and intranuclear inclusions in the brain, and only slight lesions in the liver. However if the monkey is inoculated with the virus before the immune serum, it does not develop encephalitic symptoms, but dies of ordinary yellow fever the only brain lesion being microglial proliferation.

In *rhesus* monkeys dying of encephalitis as a result of intracerebral inoculation of viscerotropic virus, at death virus is found only in the brain and not in the blood or liver where it has apparently been neutralized by the subcutaneous injection of immune serum.

These results provide additional evidence in support of the view that neurotropic potentialities are inherent in the ordinary strain of yellow fever virus and suggest that natural selection tends to favour the multiplication of virus particles specially adapted either to growth in the viscera, or to growth in the nervous tissues, according to the particular environment (*i.e.* tissue) in which the virus is placed.

E H

HOSKINS (Meredith) Treatment of Experimental Yellow Fever Encephalitis with Specific Immune Serum.—*Amer Jl Trop Med* 1935 Sept. Vol. 15 No 5 pp 545-549

The title of this paper is somewhat misleading as actually the immune serum was inoculated into *rhesus* monkeys 3, 4 or 6 hours before a subsequent intracerebral injection of neurotropic yellow fever virus.

The immune serum was inoculated into the cisterna after withdrawing a similar volume of cerebrospinal fluid. Doses of 1.75 cc. up to 6.0 cc. were used and obviously affected the course of the disease which was significantly longer than in the controls also 6 out of 31 test animals survived

E H

HOSKINS (Meredith) A Protective Action of Neurotropic against Viscerotrophic Yellow Fever Virus in *Macacus rhesus*—*Amer Jl Trop Med* 1935 Nov Vol. 15 No 6 pp 675-680

A record of experiments with *rhesus* monkeys inoculated simultaneously and at intervals up to 48 hours with both types of virus—the viscerotrophic virus being inoculated first.

The results are summarized in the following table —

Interval between inoculation of viscerotrophic and neurotropic virus	Fate of Test Monkeys				Total	
	Number survived	Number died of				
		Viscero- tropic Yellow Fever	Yellow Fever Enceph- alitis	Inter- current Infec- tions		
Hours						
0	18	1	1	3	18	
16	3	0	0	0	3	
19	2	0	0	0	2	
21	0	1	0	0	1	
24	7	8	0	1	16	
30	1	1	0	0	2	
48	1	5	0	0	6	
Total	27	16	1	4	48	

It is obvious therefore that neurotropic virus has a definite protective effect when administered simultaneously with viscerotrophic virus and to a lesser extent when administered up to 24 hours afterwards. There is no adequate explanation for these rather surprising results.

E H

SMITH (E. C.) Nigerian Insectivores (Hedgehogs and Shrews)—their Reaction to Neurotropic Yellow Fever Virus.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1936, Jan. 25 Vol. 29, No. 4 pp. 413-416. With 4 figs. on 1 plate.

The author shows that hedgehogs (*Aldoris albiventris*) from Northern Nigeria are susceptible to the neurotropic strain of yellow fever virus when inoculated intracerebrally shrews (*Crocidura suaveolens*) obtained in Southern Nigeria were not susceptible to the same virus.

Thirteen hedgehogs were inoculated intracerebrally and all showed paralytic symptoms, 7 of them dying (or being killed *in extremis*) after an average period of 10-5 days from the time of inoculation. The pathological changes in the brain were typical and in addition necrotic changes were present in the liver of two of the animals examined. Four hedgehogs inoculated subcutaneously gave entirely negative results. Eight shrews inoculated intracerebrally and four subcutaneously with the same virus gave negative results and a protection test with the pooled sera of four normal shrews was also negative.

E. H.

FENDLAY (G. M.) & MAHARRY (A. F.) The Susceptibility of Nigerian Hedgehogs to Yellow Fever.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1936, Jan. 25. Vol. 29 No. 4 pp. 417-418.

Six Nigerian hedgehogs, probably *Aldoris albiventris*, from Kano, Northern Nigeria, were found to be highly resistant to infection with viscerotropic yellow fever virus, as tested by both intraperitoneal and intracerebral inoculations.

This resistance was not due to the presence of immune bodies in the blood previous to inoculation, and is in marked contrast to the susceptibility of the hedgehogs from Omdurman Anglo-Egyptian Sudan, which are supposed to be the same species. It is suggested that there may be a physiological difference between the Sudanese and Nigerian hedgehogs. It is of interest that the susceptible hedgehogs came from a region where yellow fever has never been known to occur whilst the resistant animals came from Kano where epidemics of yellow fever are not uncommon and the disease may be endemic.

E. H.

SALEUN (G.) & CECALDI (J.) Apport du virus amaril "souris en A.E.F. [Store of Yellow Fever "Mouse" Virus in French Equatorial Africa].—*Bull. Soc. Path. Exot.* 1935 Oct. 9 Vol. 28 No. 8 pp. 693-695

A brief record of infection experiments with a neurotropic strain of yellow fever obtained from Dakar which has undergone 18 mouse passages at Brazzaville, and previously 204 passages at Dakar. The material was brought from Dakar in the form of infected mouse brains in a thermos flask and kept in the cold room during the voyage. When tested there was a slight alteration in virulence which was restored after a few mouse passages.

The authors have made a few inconclusive sero-protection tests in the Congo and hope to use the virus for further studies of the disease in Equatorial Africa.

E. H.

ZANETTI (V) La lutte contre les moustiques à Matadi en 1933
 [The Anti-Mosquito Campaign at Matadi in 1933.]—Ann Soc
 Belge de Med. Trop 1935 Mar 31 Vol. 15 No 1 pp 127-
 154 With 1 chart

Energetic measures, adopted as a result of an epidemic of yellow fever in 1928 have produced a radical transformation in the sanitary condition of Matadi the port of the entire Congo basin. For Matadi and the vicinity the sole natural mosquito breeding places are two main ravines and a number of subsidiary ones, for in the swiftly flowing Congo with its steep banks, breeding is impossible. Within the urban area, part of the ravines have been rendered permanently safe by being floored with cement in the dry season other ravines are regularly cleared and oiled under the bi-weekly supervision of a maintenance squad. During the rains unless scoured out by a fresh downpour within seven days residual breeding places are either suppressed or oiled. The necessity of unremitting supervision is emphasized. In 1928 the ravines with domestic breeding places formed the two main problems they are now devoid of danger since each breeding centre is at once located and dealt with. Tree-inspection is not neglected and holes in papaw trunks a favourite breeding place of *Aedes* [see this Bulletin 1934 Vol. 31 p 503] are filled in with tar cement. In the urban zone the predominant anopheline is *A. gambiae* (*costalis*) which as its breeding places are suppressed tends to be replaced by *A. rhodostoma*.

Though permanent and minor sanitary measures including maintenance of the latter should be employed together and are mutually complementary it is suggested that recourse should always be had at the outset to the lesser methods of mosquito control, permanent measures being adopted only when justified by the cost of labour and material necessary to carry out and maintain work of the other kind. For the purpose of maintenance the surest and most economical weapon is fuel oil.

E E A

SYMES (C B) Insects in Aeroplanes. A Brief Report and Suggestions.—Records of Med. Res. Lab. Nairobi (Entomological Section) No 6 1935 18 pp With 4 figs. Nairobi Govt. Printer

The author is concerned with the possibility that aeroplanes may import certain dangerous insects particularly mosquitoes infected with the virus of yellow fever into Kenya. He discusses methods of ridding aeroplanes of insects.

Aedes aegypti is widely distributed in East Africa and a list of localities in which it is known to occur is given though the author does not state whether it is still an urban insect or widely distributed in the countryside. As yellow fever has been recorded in the Bahr el Ghazal it is clear that there is a real danger of the carriage of an infected mosquito over long distances and it has been shown that the carriage of mosquito in aeroplanes is not rare. The author gives details obtained by searching aeroplanes on arrival in Kenya from various directions. Considerably over one hundred machines have been searched, some of which were apparently free of insects but others contained considerable numbers of insects, mainly mosquitoes though no example of *Aedes aegypti* has actually been detected. Attention is called to the fact that Kisumu is a place at which mosquitoes are particularly likely to board planes.

In the Sudan and East Africa the destruction of mosquitoes in planes is generally carried out by an insecticidal spray and an atomizer. The author describes attempts to disinfect planes by short exposures to high concentrations of hydrocyanic acid. The results are not very satisfactory because the structure of an aeroplane is so complex and because so many parts of it are not readily accessible.

P. A. Berlow.

BULLETIN DE L'OFFICE INTERNATIONAL D'HYGIÈNE PUBLIQUE. 1935.

Mar Vol. 27 No. 3. pp. 550-560.—Sur la destruction des moustiques à bord des aéronefs. [The Destruction of Mosquitoes in Aircraft.] [GRIFFITHS (T. H. D.) & MICHEL (Carl). U.S. Pub. Health Service.]

The United States Public Health Service having proved conclusively that *Aedes aegypti* can be carried by aircraft for long distances, and on flights lasting three or more days the necessity of destroying these insects in aeroplanes is insisted upon. Either a fumigant (the more radical method) or a spray can be used, the latter being employed in the various compartments of the machine before departure, during flight, at stopping places and at the end of the trip. Among fumigants certain preparations of hydrocyanic acid (HCN) give the best results, and the use of "discoids" (discs of unglazed paper soaked with liquid HCN) or "Zyklon" (fuller's earth similarly impregnated) is recommended. In both forms it can be employed easily and without danger, according to the method described, by a skilled fumigator. Half an ounce of HCN per 1,000 cubic feet may be regarded as the maximal dose for the killing of mosquitoes, but stronger concentrations may be used, especially when it is desired to destroy rodents, and also insects such as cockroaches and fleas.

Carboneide, a gas containing 1 part of ethylene oxide and 9 parts of carbonic acid, is likewise efficacious, but less so than HCN and is slightly toxic to man.

The most effective spraying fluids, the necessary properties of which are discussed at some length, are those containing a good strong extract of pyrethrum, usually dissolved in some form of petroleum. A concentrated and standardized extract of this kind, known commercially as "Pyrocide 40" consists of 4.3 gm. of pyrethrin (the active principle of pyrethrum flowers obtained by means of ethylene dichloride) dissolved in 100 cc. of mineral oil of the kerosene type. For use, a 4 per cent. dilution of Pyrocide 40 in mineral spirit, or a mixture of 1 gallon of concentrated extract of pyrethrum and 7 gallons of commercial "water white kerosene" is employed, without interfering in any way with the comfort of passengers, or affecting the working of the machine.

E. E. Austin.

WILLIAMS (C. L.) & DREESSEN (W. C.). The Destruction of Mosquitoes in Airplanes. A Preliminary Note.—Public Health Rep. 1935. May 17 Vol. 50 No. 20 pp. 683-671

The fundamental problem with which this paper is concerned is the prevention of the spread of yellow fever by aerial travel. For the destruction of mosquitoes in aeroplanes by means of a fumigant, the latter since it may have to be employed en route must be light, rapid and certain in action, and innocuous to human beings. In a series of experiments the authors tested the effect on *Aedes aegypti* of carbonide

(1 part ethylene oxide + 9 parts carbon dioxide) and of pyrethrum extract.

For more than one reason including the weight of the necessary container carbօxide proved unsatisfactory but — A concentrated oil extract of pyrethrum flowers containing 2 grams of pyrethrins per 100 cc. is highly effective against *Aedes aegypti*; when brought in contact with them in the form of a very fine spray the lethal concentration apparently being somewhere between 2 and 4 grams per 1 000 cubic feet. Such a spray in view of the small amount required, is suitable for use in a moving plane, and is believed to be harmless to human beings. Mosquitoes fumigated therewith do not immediately die whether they are able to bite before expiring remains to be proved.

E E A

WILLIAMS (C. L.) & DREESSEN (W. C.) A Nonflammable Pyrethrum Spray for Use in Airplanes.—*Public Health Rep.* 1935 Oct. 11 Vol. 50 No. 41 pp 1401-1404 [Summary appears also in *Bulletin of Hygiene*]

The development of international travel by air has increased the risk of the spread of yellow fever and if this is to be prevented without serious delay to aircraft it is essential to find a means of killing mosquitoes in aeroplanes in flight without danger to the passengers or crew.

A solution of 2 gm. pyrethrins in 100 cc. of kerosene delivered in a fine spray to the amount of 2-4 gm. per 1 000 cubic feet is effective but inflammable. Experiments were therefore made with non-inflammable mixtures. Of a 2 per cent. solution of pyrethrins in carbon tetrachloride 40 to 60 cc. per 1 000 cubic feet were required to kill *Aedes aegypti* but this caused irritation of the nose and throat, dizziness, faintness and headache in persons exposed to its effects. Mixtures of 2 per cent. pyrethrins in kerosene and 2 per cent. pyrethrins in carbon tetrachloride were next tried, and it was found that a mixture of 1 part of the former with 4 of the latter killed 100 per cent. of *Aedes aegypti* in five minutes when sprayed in amounts of 5 cc. per 1 000 cubic feet. This mixture proved by ordinary tests to be non inflammable.

Later experiments showed that a mixture of 1 part of solution of 2 per cent. pyrethrins in kerosene and 4 parts of carbon tetrachloride without pyrethrins gave equally good results, all *Aedes aegypti* being killed by 5 minutes exposure to a concentration of 5 cc. per 1 000 cubic feet. The mixture appears to be non-inflammable and to cause no inconvenience to persons exposed to concentrations of 10 cc. per 1 000 cubic feet for 15 minutes. The fact that it was so efficient in spite of the fact that it contained not more than 0.4 per cent pyrethrins caused some surprise but it was subsequently shown that a kerosene extract containing 0.4 per cent. pyrethrins is about as effective against *Aedes aegypti* as one containing 2 per cent. of pyrethrins.

Char F. White

TREILLARD (M.) Tableau synoptique pour la détermination rapide de toutes les espèces du sous-genre *Stegomyia*. [Synoptic Table for the Rapid Determination of the Species of the Sub-Genus *Stegomyia*.]—*Bull. Soc. Path. Exot.* 1935 Apr 10 Vol. 28 No 4 pp 291-292. With 1 folding fig.

This is an attempt at simplifying the recognition of species belonging to the subgenus *Stegomyia* in all parts of the world. It consists of a

synoptic figure and not a dichotomous key. The arrangement is very easy to use and it reveals very clearly the geographical distribution of the various species. But there are insects belonging to other subgenera of *Aedes* (notably *Favipes*) which the expert is very liable to put into *Sierrenia* and so to arrive at quite wrong diagnosis. The characters of the subgenera are not given. V. B. Wiggarwick.

GIL COLLADO (J.). Nuevos datos sobre la distribución del *Aedes (sierrenia) rutilus* en España con algunas notas acerca de su biología. [*Aedes rutilus*: Its Biology and Distribution in Spain].—*Medicina Pública Cálidat*. Madrid. 1935. Jan. Vol. 8, No. 1, pp. 61-84 [11 refs.]

All the specimens of *Aedes rutilus* captured, whether larval or adult, were found during the latter half of September and the whole of October which is probably therefore the time of its greatest activity. In contrast with *Aedes vexans* it does not hide in human dwellings and in the Province of Cáceres and even more in that of Salamanca the nearest houses were a long way from the place of capture. Other specimens were sent from the swampy region of Ojara in Badajoz Province.

The breeding sites were most commonly hollows in rocks, nearly always quite small but relatively deep, as if the females had chosen collections of water with small surface in relation to volume to guard against drying up and evaporation. These localities did not contain growing vegetation but were often of a dark, almost coffee colour from the quantity of decomposing matter. They are found at various altitudes, e.g., at La Fregeneda and Alcolea about 1,000 metres and at Goso (900) and La Granja (1,100). The distances separating these places indicate that this species is more widely spread than is generally believed. B. H. S.

EVANS (A. M.) & WALKER (G. R.). Notes on Brazilian Morphines. Species observed in the Amazon Valley and Record of *Aedes albifasciatus* Macq. breeding a Ship in Harbour.—*Proc. Roy. Ent. Soc. Parasit.* 1935. Dec. 18. Vol. 29. No. 4. pp. 453-467. With 1 fig.

RELAPSING FEVER AND OTHER SPIROCHAETOSSES

KEMP (Hardy A.) MOURSUND (W H) & WRIGHT (H E) Relapsing Fever in Texas. V A Survey of the Epidemiology and Clinical Manifestations of the Disease as it occurs in Texas.—*Amer Jl Trop Med* 1935 Sept. Vol. 15 No 5 pp 495-506. With 3 figs.

A detailed study of the subject based largely on the co-operation of over 600 Texas physicians from all parts of the State who sent replies to a carefully worded questionnaire

The results indicate that during 1930 to 1934 inclusive there were 258 reported cases of relapsing fever in Texas. Spirochaetes were found in 80 of these patients and in the others the diagnosis seems well established by clinical symptoms and by the specific response to anti-spirochaetal treatment. Practically all these cases occurred amongst farm and ranch people the exceptions among city dwellers being those who might have acquired the disease during some trip to rural districts. The seasonal incidence late summer and autumn coincides with the activity of *Ornithodoros turicata* and the disease is restricted to tick-infested localities within a given district.

The symptoms of the disease include a very sudden onset during which the temperature may rise to 105 or 106°F. In the absence of treatment there is little or no abatement in temperature during the next three relapses after which they become less severe. The length of the afebrile period is irregular in severe cases but in others is often 4 to 5 days. A macular rash is present in about half the cases but there seems no correlation between this and the severity of the disease. Splenic enlargement and tenderness are common. Liver enlargement is infrequent and jaundice rather uncommon. The only common sequelae were myalgia and a stubborn muscular asthenia. The infections were often cured by single doses of 0.01 gm per kilo body weight of neosalvarsan. No fatal cases were reported. E Hindle

HARMS (W B) & WHEELER (C. M.) Tick Transmission of California Relapsing Fever—*Jl Econom Entom.* 1935 Dec. Vol. 28. No. 6 pp 846-855 With 1 fig [16 refs.]

A general review of the subject including a brief survey of the five species of the ticks of the genus *Ornithodoros* occurring in California, viz *O. coriaceus*, *O. turicata*, *O. talaje*, *O. (Oribius) megnini* and *O. hermsi* followed by the results of laboratory investigations on the tick transmission of the Californian strain of relapsing fever.

Attempts to transmit this strain from infected to normal white mice by the bites of both nymphs and adults of *Ornithodoros coriaceus* gave negative results. Similar negative results with one doubtful exception were also obtained by the inoculation of the ground-up contents of these ticks into normal mice. With *Ornithodoros hermsi* a total of 39 feeding tests conducted on white mice resulted in 11 positive transmissions with both adult and late nymphal stages. Moreover as previously noted [ans p 55] this species has been definitely proved to be infective in nature in the neighbourhood of Big Bear Lake California.

Finally an account is given of the infection with relapsing fever contracted in the field at Packer Lake, Sierra County by one of the authors (C. M. W.)

E H

HORN (W. B.) & WHEELER (C. M.) *Ornithodoros hermsi* Wheeler as a Vector of Relapsing Fever in California. [Abstract].—*J. Parasitology* 1935 Dec. Vol. 21 No 6. p. 440.

This new species of tick is found at elevations ranging from about 5 000 to 8 000 feet in California and is commonly found in the nests of chipmunks proven reservoirs of the spirochaete of relapsing fever. Ticks taken in nature in cottages where cases have occurred when allowed to bite white mice transmitted the spirochaete. Transmission is effected by the bite of both female and male ticks and in all instars spirochaetes being observed in the blood of white mice usually about 5 days after the infective bite. A small percentage, probably less than fifteen per cent. of the offspring of infective females are able to transmit the disease, thus proving hereditary transmission. When clean ticks are fed on experimentally inoculated mice, the percentage of ticks becoming infective appears to be about thirty per cent., based on rather meagre experimental data. *Ornithodoros hermsi* deposits well over 200 eggs in a given season, from May to October. The incubation period ranges from 15 to 21 days at a temperature of 75°F and humidity at about 90 per cent. The time required for the several instars depends on the opportunity to feed. After each feeding, requiring about 15 minutes, occasionally as long as 30 minutes, there is a moult, maturity being reached after the fifth including the first which is effected before hatching. The cycle from egg to egg under optimum conditions requires about four months."

WHEELER (Charles M.) A New Species of Tick which is a Vector of Relapsing Fever in California.—*Am. J. Trop. Med.* 1935 July Vol. 15. No. 4. pp. 435-438.

SERRAULT (André) & LIVY (H.) Spirochète hispano-africaine chez un homme piqué par une tique du chien (*Rhipicephalus sanguineus*). [Spanish-African Relapsing Fever In a Man Bitten by a Dog Tick (*R. sanguineus*)].—*Bull. Soc. Path. Exot.* 1935. Nov. 13. Vol. 28. No. 9. pp. 789-790.

The record of a case of relapsing fever in Algeria, in which the patient developed the attack 18 days after having been bitten by a dog tick, *Rhipicephalus sanguineus*.

The spirochaete was isolated by inoculating the patient's blood into guinea-pigs and found to be *Spirocheta hispanica* the third case of this infection in Algeria that has been confirmed by laboratory examination. The general evidence supports the view that the dog tick was responsible for the infection. E. H.

CASO (Martín) & PASTUAL (Alonso) Un caso de leishmaniasis por fiebre recurrente española.—*Medicina Peñosa Callejas* Madrid 1935 May Vol. 8. No. 5. pp. 247-248.

MEDULLA (Candido) Sulla dibattuta questione della presenza della ricorrente da *Sturnerus duttoni* in Cirenaica. [On the Disputed Question of the Existence of Relapsing Fever in Cyrenaica].—*Arch. Ital. Sci. Med. Colon.* 1935. Oct. Vol. 16. No. 10. pp. 733-739. With 2 figs.

The following account should remove the question beyond the realm of dispute. A man living in Apollonia (Cyrenaica) was bitten on the

left arm by a tick (? *O. savignyi*) and a few days later fell sick with shivering intense headache general pains temperature 39.4°C. palpable spleen occasional bilious vomiting Examination of the blood showed numerous spirochaetes. He was treated with neomycin and recovered.

The doctor who gave the injection accidentally pricked himself with the syringe which was soiled with blood from this patient. In spite of local application of antiseptic, he was attacked 5 days later and showed the same symptoms as those above. Examination of his blood was also positive for spirochaetes. Neomycin, 0.2 gm. intramuscularly on alternate days and later 0.3 gm. with two-day intervals effected a cure.

H H S

MEDULLA (Candido) Nuovo contributo allo studio della febbre ricorrente in Cirenaica. [Further Case of Relapsing Fever in Cyrenaica.]—Arch Ital Sci Med Colon 1935 Aug 1 Vol 16 No 8, pp 610-615 With 3 charts & 1 fig English summary (3 lines)

The author recorded cases of relapsing fever on former occasions in Cyrenaica [see this Bulletin 1934 Vol. 31 p. 853] and now describes three more. A noteworthy point is that in two of them facial paralysis developed one 12 days after a febrile access, the other on the next day after. In the latter there was also paralysis of the hypoglossal nerve. [The first may have been a coincidence since the interval was of some length but the condition is one to look out for it may be a more frequent complication or sequela than is generally believed.]

H H S

LATYCHEV (N.) Découverte des spirochères patogènes pour l'homme chez les rongeurs sauvages dans la vallée de la rivière Mourgab (Turkmenie). [Spirochaetes Pathogenic for Man discovered in Wild Rodents of the Mourgab Valley Turkmenistan, U.S.S.R.]—Med Parassit & Parasitic Dis Moscow 1935 Vol 4 No 5 [In Russian pp 417-420 With 3 figs. French summary p 420]

The author examined wild rodents *Rhombomys opimus* (? Sand-eel) inhabiting the mountain slopes and valleys near the River Mourgab by Tachta Bazar Turkmenistan and in more than 12 per cent. of them he found spirochaetes in the blood. Inoculation of this blood into the skin [of the author himself?] resulted in an attack of relapsing fever after an incubation period of 14 days there were 9 attacks of fever [the length of the apyrexial periods are not stated in the French summary from which this abstract is made] accompanied by enlargement of the spleen. In each of the recurrences of fever the spirochaetes were present but only in the early days of the afebrile intervals. These spirochaetes were found also in 5 per cent of the local bats *Rhinophorus* sp. [In the French summary there is no statement as to the identity of the spirochaetes from the relapsing character of the infection one would expect *Spirillum minus* of rat bite fever. Spirochaeta ticeihaemorrhagiae and Spirochaeta hebdomadis do not cause a series of febrile attacks such as are mentioned in the summary.]

H H S

LEPTOSPIROSIS.

L. MOLLASSET (Pierre) & ERNEST (Berthe). A propos du diagnostic microbiologique de la spirochétose méningite pure. [The Microbiological Diagnosis of Simple Spirochaetal Meningitis.]—Bull. et Mém. Soc. Vét. Hôpital de Paris. 1935 Dec. 9 51st Year 3rd Ser. No. 31 pp 1632-1637

ii — & — Contribution à l'étude physio-pathologique de la spirochétose méningite pure. [A Contribution to the Pathology and Physical Signs of Simple Spirochaetal Meningitis.]—Ibid. pp 1638-1643 With 1 chart.

i. The authors call attention to the relative frequency of cases of simple meningitic forms of spirochaetal jaundice for during 1935 about a score of such cases were diagnosed at the Pasteur Institute in Paris. Sero-diagnostic methods are recommended as the simplest and most effective means of recognizing these meningitic cases and examples are given of the results of serum tests on three such infections in children. The results are given below in tabular form and show that the meningitic type is not specially associated with water strains.

	Sero-diagnostic strains	Sero-diagnostic strains	Sero-diagnostic strains	Sero-diagnostic strains	Sero-diagnostic strains	Sero-diagnostic strains	Water strains	Water strains		
								Strain	Strain	Strain
S	C	S	S	S	S	Rabbit	Monkey	Human	Vinegar	
M	1/100 000	0	1/10	0	1/100	1/50	1/10	1/10	1/10	+
B	1/5 000 000	0	0	0	1/10	1/10 000	1/50	1/50	1/50	-
Br	1/5,000,000	0	0	0	1/100	1/100	1/100	1/500	1/100	-

ii. An examination of the cerebrospinal fluid of the above mentioned cases showed that antibodies were absent even though all three were typical cases of simple spirochaetal meningitis. In a discussion of the problem it is insisted that by physical signs there is no means of distinguishing between the meningitic reactions in cases of simple spirochaetal jaundice and those of simple spirochaetal meningitis. There are the same modifications in the cerebrospinal fluid, the same discrepancies between the agglutination titre of the blood and cerebrospinal fluid, and also the same impermeability to fuchsin as tested in a baboon, inoculated by means of lumbar puncture with 1 cc. of a culture of *S. interhaemorrhagiae*.

This symptom is not considered to indicate any special type of infection or any particular strain of spirochaete, but merely another clinical feature of ordinary spirochaetal jaundice which may or may not be present.

E. H. Hale.

MARIE (Julien) & GARNIER (Pierre). La méningite spirochétosique épidémique chez l'enfant. [Spirochaetal Meningitis Epidemic in Children.]—Bull. et Mém. Soc. Méd. Hôpital de Paris. 1935 Nov 18. 51st Year 3rd Ser. No. 28. pp 1454-1465.

A detailed description of three cases of meningitis occurring in children, due to infection with *S. interhaemorrhagiae*. The patients were

aged 10, 12 and 13 years respectively and this seems to be the first record of spirochaetal meningitis assuming an epidemic character in children. The cases occurred during August and September and it is suggested that bathing may have been responsible for the infection. The symptoms were an acute febrile meningitis with a sudden onset. The cerebrospinal fluid showed a marked cellular reaction which persisted for about four weeks whilst there was only a slight rise in albumin which returned to the normal by the tenth day. All three patients recovered in a few days without any sequelae and without having shown any jaundice.

There was no certain clinical sign indicating the spirochaetal nature of the disease and this was only detected by obtaining positive sero-diagnostic tests and also by infecting guineapigs by the inoculation of urine from one of the patients.

The disease is probably more widespread than these few records would suggest and acute meningitic cases in children especially during the summer should be examined both serologically and by the inoculation of urine into guineapigs.

E H

GUILLAIN (Georges) & LERERBOULLET (Jean) Spirochétose méningée pure à forme mentale. [A Mental Form of Simple Spirochaetal Meningitis.]—*Bull et Mém Soc Méd Hôpital de Paris* 1935 Nov 18. 51st Year 3rd Ser No 28. pp 1509-1512.

The description of an epileptic patient who in the course of one of his attacks fell into the Seine and subsequently developed a state of torpor associated with asthenia and amnesia and accompanied by fever.

Sero-diagnostic tests confirmed the view that this patient became infected with a simple meningitic form of spirochaetosis after immersion in the river and the psychic troubles seem to have been connected with the infection since they disappeared completely as soon as the patient had recovered from the spirochaetal infection.

E H

LABBÉ (M.) BOULIN UHRY & ULLMAN Sur un cas de spirochétose icterigène accompagnée de paraplégie. [A Case of Spirochaetal Jaundice accompanied by Paraplegia.]—*Bull et Mém Soc Méd Hôpital de Paris* 1935 Nov 18. 51st Year 3rd Ser No 28. pp 1504-1509 [16 refs.]

The description of a fatal case of infection with *S. icterohaemorrhagiae* which showed typical symptoms of severe jaundice and nephritis accompanied by paraplegia.

The main interest of this case lies in whether the spirochaetes were responsible for the neurological syndrome and after considering previous records in Japan together with the severity of the case and the early infectivity of the urine (on the 7th day) the author concludes that the spirochaete probably was responsible for the development of the paraplegia.

E H

MOLLARET (Pierre) & FERROIR (Jean) A propos de deux observations de spirochétose ictero-hémorragique dont une avec myocardite mortelle. Contribution à l'étude de la réaction méningée des formes typiques icterigènes. [Two Cases of Spirochaetal (44)]

B2

Jaundice one with Fatal Myocarditis. A Study of the Meningitis Reaction in Typically Jaundiced Cases.)—Bull. et Mém. Soc. Méd. Hôpital de Paris. 1935 Dec. 9. 51st Year 3rd Ser No. 31 pp 1622-1631 With 5 figs.

A detailed account of two cases of infection with spirochaetal jaundice in Paris both of which showed distinct meningitic reactions, in one case evidenced by the clinical symptoms and in the other by modifications in the cerebrospinal fluid.

This relative independence between the clinical signs and changes in the fluid seems to be an important feature of this type of infection. It is associated with a predominance of cytological modifications rather than albuminorachia and also with characteristic changes in the colloidal benzoin reaction.

The various modifications in the cerebrospinal fluid in some cases seem to be merely a reflexion of the changes in the blood, and meningitic symptoms may occur almost without the development of antibodies in the subarachnoidal region. E. H.

MARCHAL (Georges) SOUIN (P) & ROY (A.) Spirochétose ictero-hémorragique. Troubles cardiaques et modifications électrocardiographiques. [Spirochaetal Jaundice. Cardiac Symptoms and Electrocardiographic Changes.]—Bull. et Mém. Soc. Méd. Hôpital de Paris. 1935 Dec. 9. 51st Year 3rd Ser No. 31 pp. 1651-1654.

A description of a case of infection with *S. interhaemorrhagiae* in which the patient showed symptoms of myocarditis, which were also recognised by examination with the electrocardiograph. E. H.

KOURILSKY (Raoul) & MAKOU (H.) Les formes "pseudoinfluenzales" de la spirochétose anictérique. [Forms of Spirochaetal Infection without Jaundice simulating Influenza.]—Bull. et Mém. Soc. Méd. Hôpital de Paris. 1935 Nov 18. 51st Year 3rd Ser No. 28 pp 1514-1519

The description of two cases of infection with *S. interhaemorrhagiae*, identified by sero-diagnostic tests neither of which showed any jaundice or meningitis, but symptoms suggesting influenza, such as fever and backache accompanied by redness of the pharynx, exanthematic stomatitis etc.

Both the patients were in the habit of river bathing and the infections occurred in the summer and in view of the many atypical forms of this disease, the authors are of the opinion that cases of "influenza" occurring in the summer should be viewed with suspicion as possible atypical forms of spirochaetal jaundice. E. H.

TROISIER (Jean) BARRY (Maurice) & MACREL (Cl.) Spirochétose ictero-hémorragique fébrile pure [Leptospirose fébrile pure]. [Simple Febrile Spirochaetal Jaundice (Simple Febrile Leptospirose).]—Bull. et Mém. Soc. Méd. Hôpital de Paris. 1935 Nov 18. 51st Year 3rd Ser No. 28 pp. 1465-1470 With 1 chart.

The description of the case of a patient who apart from a severe injection of the conjunctivae showed no other clinical symptoms except a typical febrile syndrome. There was no trace of jaundice, haemorrhages, nor any meningitic syndrome, but the inoculation of the

cerebrospinal fluid collected on the 6th day into a guineapig resulted in the production of a typical and fatal infection with *S. icterohaemorrhagiae*. Serodiagnostic tests of the patient's blood were negative on the 6th day but were positive on the 12th day

E H

CAIN (André) CATTAN (Roger) & BENSAUDE (Alfred) Trois cas atypiques de spirochétose ictero-hémorragique. [Three Atypical Cases of Spirochaetal Jaundice]—*Bull et Mém Soc Méd Hôpital de Paris* 1935 Nov 18. 51st Year 3rd Ser No 28. pp. 1470-1475

The description of three cases of infection with *S. icterohaemorrhagiae* the first simulating catarrhal jaundice the second a pseudo-typoid and the third showing hardly any definite clinical symptoms beyond three to four days of fever accompanied by certain digestive troubles.

Injection of the conjunctivæ was a constant feature and all three patients were in the habit of bathing in the river. The nature of the infection was determined by obtaining positive serodiagnostic tests.

E H

SABRAZÈS (J.) LANDELONGUE (G.) DUTRÉNIT (Jean) & BONNEL. Forme anémique et subictérique de la spirochétose d'Inada Ido [An Anaemic and Sub-Icteric Variety of Spirochaetal Jaundice]—*Gaz hebdomadaire de Bordeaux* 1935 Dec. 22. Vol. 56 No 51 pp 807-810

A description of a case in which during the first 10 days of the infection the number of red cells diminished to a half accompanied by leucocytosis and considerable arterial hypotension. This was followed by the development of febrile symptoms and jaundice which gradually subsided but the anaemia has persisted with oscillations for more than four months without any haemorrhages except slight epistaxis at the beginning of the fever

E H

HASLE (G.) TOULLEC (F.) & VAUCEL (M.) Spirochétose ictero-hémorragique et spirochétoses anictériques observées à Hanoï. [Spirochaetoses with Haemorrhagic Jaundice and also without Jaundice observed in Hanoï.]—*Bull Soc Méd-Chirurg Indochine* 1935 May Vol. 13 No 4 pp 407-428. With 8 charts.

The authors give a detailed account of 5 cases of typical Weil's disease observed in Hanoï and then 7 cases in which the clinical symptoms, including the absence of jaundice separated them off from the preceding. As a result mainly of agglutination tests this second group of cases would seem to belong to the seven-day fever and autumnal fever caused by *S. heidelbergii*

E H

CAROLI (Jacques) Un cas d'axotéma fébrile spirochétosique. [A Case of Febrile Spirochaetosis with Axotaemia.]—*Bull et Mém. Soc. Méd. Hôpital de Paris* 1935 Nov 18. 51st Year 3rd Ser No. 28. pp 1513-1514

The description of the case of a patient a river bather who became infected with *S. icterohaemorrhagiae* as detected by serodiagnosis but showed merely febrile symptoms accompanied by axotaemia which returned to normal by the 12th day

E H

MASSIAS (Charles) Un cas mortel de spirochétose icterigène à Travinh (Cochinchine). [A Fatal Case of Spirochaetal Jaundice at Travinh (Cochin China).]—*Bull. Soc. Méd.-Chirurg. Indochine*. 1935. July-Aug. Vol. 13. No. 6. pp. 788-790.

The record of a case of spirochaetal jaundice in an Annamite with typical clinical symptoms, who died on the 7th day of illness. Serum-agglutination and lysis tests were positive for *S. microtrombiculosis*.

E. H.

MASSIAS (C.) Un nouveau cas mortel de spirochétose icterigène en Cochinchine avec autopsie. [An Additional Fatal Case of Spirochaetal Jaundice in Cochin China with Autopsy].—*Bull. Soc. Path. Exot.* 1935 Nov 13. Vol. 28. No. 9 pp. 791-792.

The description of a typical case of spirochaetal jaundice in an Annamite, in which the diagnosis was confirmed by the results of autopsy and also by serum-agglutination tests. [See above.]

E. H.

RAGNOT (Ch.) DELBOVE (P.) NOUVES VAN HOOGH & HO-TUO-NGAM Nouvelle note sur la spirochétose icterigène en Cochinchine. [An Additional Note on Spirochaetal Jaundice in Cochin China.]—*Bull. Soc. Méd.-Chirurg. Indochine*. 1935. Sept. Vol. 13. No 7 pp. 817-824.

Clinical observations on five cases of this disease occurring in Cochin China, where the symptoms show the same wide range of variation as in other parts of the world. In four cases the diagnosis was confirmed by blood inoculations into guinea-pigs and in the fifth by agglutination tests.

E. H.

WICMORE (J. B. A.) & DERRING (G. M.) Leptospiral Jaundice in a Groom.—*J. Roy. Army Med. Corps*. 1936. Jan. Vol. 68. No 1 pp. 21-26. With 1 chart.

The record of a case in which the infection was almost certainly acquired from a rat by contamination with its blood. Seven days before the onset the patient was slightly bitten on the finger by a dog that had just killed a rat. The symptoms of the disease were typical and spirochaetes were found in the urine.

E. H.

BONZI (A.) Forme clinique de spirochétose ittero-émorragique.—*Sperimentale* 1935 Aug-Oct. Vol. 89 No 4-5 pp. 535-554 (42 refs.) English summary (10 lines)

ERNEZ (Berthe) Sérodiagnostic, par agglutination de la spirochétose icterohémorragique. Technique et interprétation. [The Serum Diagnosis, by Agglutination, of Spirochaetal Jaundice. The Method and its Interpretation.]—*C. R. Soc. Biol.* 1935. Vol. 129. No 34. pp. 618-622.

Details of the methods used at the Pasteur Institute, Paris, by the author who has been for many years in charge of the examination of the specimens sent in for sero-diagnosis in cases of suspected spirochaetal jaundice.

A 4-day old culture of the living spirochaete in 20 per cent. rabbit serum in saline was generally used, and it is necessary to examine it by

the dark-ground to see that active spirochaetes are present. If older cultures are used they should be centrifuged for a short time to remove any debris from the medium. The patient's serum should be fresh and clear and when examining cerebrospinal fluid no traces of blood should be present.

For the test three tubes are used, the first receives 0.1 cc. of the undiluted serum, the second 0.1 cc. of the serum diluted 1:10 and the third 0.1 cc. diluted 1:100. 0.9 cc. of culture is added to each of the tubes and also to a fourth tube which receives 0.1 cc. of saline and serves as a control. The tubes are kept at 37°C. for one hour before examination. With cerebrospinal fluid dilutions of 1:10, 1:50 and 1:100 are used. As a rule this test is sufficient to indicate whether the specimen is positive or negative but in some cases the titre of the serum is of interest and then dilutions up to 1:100,000 or more are prepared.

Examination is always made by means of dark-ground illumination using a No. 6 objective and No. 4 eyepiece. With positive sera, dilutions of 1:10 generally contain free spirochaetes but their movements are feeble; in addition there are a few spirochaetes agglutinated in irregular masses. In the 1:100 dilutions there are free spirochaetes and also more or less spherical masses covered with feebly motile spirochaetes undergoing lysis. In the 1:1,000 dilution there are numerous small masses of agglutinating spirochaetes somewhat resembling the appearance of red blood cells in a hypertonic solution usually no free spirochaetes are present. If the spirochaetes remain active even if they agglutinate in the lower dilution the reaction is doubtful and if a second test with serum collected a few days later gives similar results, it must be regarded as negative.

Agglutination may be observed commonly in dilutions up to 1:100,000 but lysis soon disappears in dilutions above 1:1,000.

With cerebrospinal fluid doubtful reactions have not been observed since the limit of dilution rarely exceeds 1:100 even when the serum of the patient agglutinates in dilutions of 1:100,000. E H

VERCÉ (J). Les spirochétoses du chien. [Dog Spirochaetoses.]—
Rev Gén de Med Vet 1935 Dec 15 Vol 44 No 528.
pp 705-711

A brief summary of the supposed spirochaetal infections of the dog including *S. canina* Stuttgart disease or haemorrhagic gastro-enteritis stated to be due to *S. melagenenes canis*; canine leptospirosis including two strains *Leptospira icterohaemorrhagiae* and *L. canicola* and finally infections of fusiform bacilli and spirochaetes.

E H

RAT BITE FEVER.

CHODZKO (W). Les premiers cas de sodoku observés en Pologne et en Lithuanie. [The First Cases of Sodoku observed in Poland and Lithuania.]—Bull Office Internat d'Hyg Publique 1935 Sept. Vol 27 No 9 pp 1769-1773

A case of this disease was observed by CZYZEWSKI and BAOSA in Poland in 1931 and in addition to a description of this case, the author

also gives an account of three more examples of the disease in Lithuania. The clinical symptoms, pathological findings and treatment were typical.
E. Hinde.

MÜLLER (Kurt L.) Ein Fall von japanischer Rattenbißkrankheit (Sodoku) in Oberösterreich. [A Case of Japanese Rat-Bite Fever (Sodoku) in Upper Austria.]—*Wien. Klin. Woch.* 1935. Nov 22. Vol. 48. No. 47 pp. 1449-1450

The description of a typical case of rat-bite fever in an Austrian farm servant. The diagnosis was confirmed by inoculation into a guinea-pig which showed *S. suis* in its blood. The patient was cured by injections of neosalvarsan starting with a dose of 0.3 gm., gradually rising on the 8th day to a dose of 0.9 gm., and the author considers that a total of at least 3 gm. should be used in order to avoid any relapses.
E. H.

TALEG. Sur un nouveau cas de sodoku à Pondichéry. [A Case of Rat-Bite Fever in Pondichéry].—*Ann. de Med. et de Pharm. Colon.* 1935. July-Aug.-Sept. Vol. 33. No. 3. pp. 838-840.

A woman of 37 years passed through a normal parturition. Three days later she had a rise of temperature and complained of stabbing pain in the right shoulder which was a little swollen and showed inflamed lymphatics running towards the clavicle and axilla, and a small ulcer in the middle of the swelling. A history was obtained that eight days before coming to hospital, i.e., 11 days previous to the onset of symptoms she had been bitten by a rat—the wound had healed in 3 days. The fever dropped and the general condition improved after two injections of sulpharvenal and the patient left hospital 14 days after her admission. Three weeks later she had a return of the pain and repeated chills with rise of temperature. She was given 3 injections of Uctarsyl [? composition] 0.15, 0.3 and 0.4 gm. the last two at 4 and 6 days interval and the symptoms cleared up. She was a nurse at the hospital and has thus been under observation, but so far there has been no further relapse. [There is no statement as to finding or even looking for the spirochete.]
H. H. S.

BUNNSTAD (Gunnar) Et tilfelle av rottebittsykdom.—*Norsk Mag. f. Laegevidenskaben.* 1935. July. Vol. 96. No. 7. pp. 729-734.
With 2 figs. [10 refs.] English summary

PLAQUE

BULLETIN DE L'OFFICE INTERNATIONAL D'HYGIÈNE PUBLIQUE. 1935
 Sept. Vol. 27 Supplement to No 9 67 pp With 1 fig &
 2 folding maps. (5 bibliographies.)—La peste africaine [JORGE
 (Ricardo)] [Plague in Africa.]

This is a valuable monograph not only for those concerned with plague in one or other part of the African continent, but for students of plague in general. It contains chapters on ancient history geographical distribution statistics vectors, clinical plague and prophylaxis together with two useful maps of the invasions epidemiological situation and predominant pestigenic rodents in Africa. Much the most interesting chapter however is that with the full name of The pestigenic vectors rodents and fleas. Common plague and selvatic plague. The rat the flea and man in African plague. Interhuman transmission. The free flea. Zoological map.

Plague is in reality the work of two rats—*Epimys norvegicus* the brown rat, and *Epimys ratus* the black rat. Whereas the brown rat remains true to type the black rat shows many variations and the variants such as the *alexandrinus* of Egypt the *kiyabius* of Uganda and the *frugorum* or *lectorum* may be more numerous than the type. The two main rat types are domestic rats but can become rural on occasion. By far the most important of the rat fleas is the *Xenopsylla cheopis*. At the present day fleas are sought for not only on the rodents themselves but as free fleas in rodent burrows in clothing and in the midst of grain which is in course of transit.

Rodents which are capable of being infected with plague are divided up into the pestiferous and the pestigenic according as they are practically concerned or not with the transmission of plague. The common mouse for example is a pestifer very susceptible of plague but not ordinarily a transmitter. It is the same with fleas. Not every flea is given the plague charter. Such a distinction will depend upon its capability of attacking man and of developing the necessary proventricular block whereby plague bacilli can be discharged into its skin puncture.

A special place is accorded in Africa and especially South Africa to the plague of the hinterland. Whereas the brown and the black rat are predominantly responsible for the plague of the ports and coast the former for the north of Africa and the latter for the remainder of the continental littoral, there is a certain type of plague for which the zoological and geographical origin is different. This plague is not the work of domestic but of wild rodents it rages not in the inhabited parts of the country but in the uninhabited and as an epizootic. This has been named by Dr Jorge selvatic plague. In South Africa the author of this type of plague is the gerbil, *Tatera lobengulæ*. By contact of the rat *Rhabdomys pumilio* and the multimammate rat *Mastomys couchi* with the gerbils a connexion is established between human habitations of the ports and the inland regions and so plague is brought to the scattered farms of the veld. The persistence of selvatic plague in South Africa is regarded as highly dangerous because of its tendency to spread into other territory. In Northern Africa the plague of the *bled* of Tunis has been regarded but somewhat doubtfully as selvatic and due to marmots. Further South in that region the *Praomys roulei* is predominant a very susceptible but hitherto unaffected rodent.

Although the sequence rat-flea-man, is recognized as a necessary one, it is not accepted in its entirety as the only one and the sequence itself may be very long drawn out in time. We have cases presenting themselves in practice of the "epizootic without epidemic" and "epidemic without epizootic." The consideration of these questions leads up to those of interhuman convection and the transmission of plague by free fleas. The subject is too lengthy to treat in an abstract, but it may be remarked that the *Pulex irritans* of man, and not the rat flea may by reason of its enormous numbers in certain countries such as Morocco become a plague vector from man to man and that the plague-infected rat flea may itself by reason of its long life after separation from its host and by its preservation of infectivity for months, become a transmitter of plague.

Dr Jorge does not seem to show great enthusiasm for vaccination prophylaxis against plague. His hopes of remedy are based mainly on deratization, disinfection from fleas, rural hygiene and the march of civilization. Nor is he forgetful of the fact that "plague can effect itself without any intervention."

W F Berry

UNION OF SOUTH AFRICA. ANNUAL REPORT OF THE DEPARTMENT OF PUBLIC HEALTH FOR YEAR ENDED 30TH JUNE, 1935 [THEODORE (E. N.) SECRETARY] [Plague pp 32-35 Anti-Pest Measures pp. 85-89]

Plague was a matter of great concern in South Africa during the year under review. The mortality among veldt rodents assumed great proportions and there was considerable incidence among human beings. This had not been altogether unexpected, for during 1933-34 the season had been especially favourable for the growth of grasses on the seeds of which the gerbille depends for its existence. Waves of plague infection began to make their appearance among these rodents and from them was transmitted to human beings by the main intermediary between the gerbille and man—the multimammate mouse. The number of human cases was greatest in the Orange Free State and amounted to 197 with 141 deaths. The outbreaks of plague were of some advantage because it enabled officials to impress upon local authorities with some success the need for immediate antirodent measures. It has always been difficult, when human cases of plague are absent, to arouse the enthusiasm of the smaller local authorities for active campaigns particularly in connection with the "building out of rodents from stores and dwellings."

In another part of this report reference is made to antipest measures for railways and harbours. It is pointed out that the prevention of infestation rather than disinfection is aimed at. This can only be accomplished by a continuous patrol of sections and constant inspection of and repair to the rodent proofing of structures." The system of patrolled sections can be very readily changed from one of routine antirodent work to work in affected plague areas "Ratproofing, i.e. building the rat out of railway premises, consists of (a) making natural harbourages such as guttering, roof-ridge and hollow walls impossible. Access to these places is prevented by wire netting and sheet iron, every corrugation and space being attended to. Floors where solid are made of concrete or asphalt and the outsides of foundations are protected with sheets of corrugated

iron to a depth of two feet to prevent access from outside. (b) disinfecting artificial harbourage. Stacks of grain and merchandise are disinfected and turned over at regular periods old records are being kept elsewhere or tidied and made incapable of harbouring rodents.

W F H

ROBERTS (J Isaer) The Relationship of the Cotton Crop to Plague, and its Rôle as a Vehicle for Rats and Fleas in East Africa.—*Jl Hygiene* 1935 Aug Vol 35 No 3 pp 388-403. With 1 graph.

Some authors have expressed the view that there is a close relation between the transport of cotton seed and the introduction of plague infection. It is this question which the author has investigated both by definite survey and epidemiological investigation at Mombasa, which is the main port for the East African Coast, and by definite feeding of rats with cotton seed to determine its attractiveness as a food. He has found that Mombasa is open to infestation with rats and fleas from up-country districts where plague is endemic but only on one occasion has any suspicion been attached to the carriage of infected fleas or rats. Again it is well known in agricultural circles that young animals such as sheep and calves when fed on cotton seed develop anaemia, nephritis and gastroenteritis. On historical grounds also the evidence is strongly against cotton having any association whatsoever with plague. Plague occurred in East Africa long before the introduction of cotton as a crop. The native populations of both Kenya and Uganda were suffering from a high plague mortality before they had commenced cultivating this crop and to-day in Kenya plague is only endemic in areas where no cotton is being grown. The author's conclusions are —

"(1) Cotton seed is not a rat-attracting foodstuff nor does it provide a desirable food. (2) Cotton seed up to the time of export and for some time after is toxic to the majority of *Rattus rattus* and when fed solely or when rats are forced through hunger to nibble at small quantities a large proportion of them is killed. (3) Cereals and vegetables if present, are always eaten in preference to cotton seed. (4) The cotton-seed export from Kenya and Uganda can be regarded as guiltless in the carriage or dissemination of plague infection, either through the agency of fleas or rats." W F H

HOPKINS (G H E.) Some Observations on the Bionomics of Fleas in East Africa.—*Parasitology* 1935 Oct Vol 27 No 4 pp 480-488.

The paper describes observations on the duration of life of certain stages of fleas under partially controlled laboratory conditions.

The majority of the author's experiments were performed with fleas of unknown age taken direct from a rat which had been trapped. It may therefore be claimed that the experiments indicate how long a flea might live if it moved away from a dead host under natural conditions. The author exposed his insects to three combinations of temperature and humidity and records the length of life (males and females separately) of *Xenopsylla cheopis* and *brasiliensis*. The data in these and other experiments are fully recorded, the mean length of life and its standard error also the maximum and minimum being shown in tables. The author observed that under the conditions of his experiment female fleas laid a small number of eggs nearly all of them on the first day of the experiment. Eggs and the larvae and pupae which

came from them were subjected to controlled conditions. It appears that neither *A. cheopis* nor *brasilianensis* could be successfully bred through at either 15° or 30°C. At 20°C., in air approaching saturation, it was found that the duration of the larval and pupal stages combined was about 45 days for females and a little longer for males of both species of *Xenopsylla*.

A short series of experiments was also carried out with adult, recently hatched fleas the duration of life of which at 20°C. was studied. It is clear that the duration of life was materially longer than that recorded under very similar conditions by LEXON [this Bulletin 1932, Vol. 29, p. 839]. No reason was found to explain this discrepancy which is considerable.

P. A. Barton.

ROBERTS (J. Ingarr) The Endemicity of Plague in East Africa.—East African Med JI 1935 Oct. Vol. 11 No. 1 pp. 300-319.

WILLIAMS (C. L.) History of Bubonic Plague in New Orleans.—Int'l Trop Med JI 1935 Sept Vol. 15 No. 5 pp. 555-569

A clear-cut history of plague as it has affected and been eradicated from a sea-port town carries an instructive lesson. Plague did not appear in New Orleans until the facts of its mode of transmission and its mode of suppression were already known. Its history is all compressed within a period of 13 years from the time that the first plague rat was trapped in 1912 to 1925 when the last known plague-infected rat was found.

An active search was made throughout the city for two years after the appearance of the first rat case and not till then did the first human case come to light. Now began the first human and rodent outbreak which as a conjunction of epizootic and epidemic came to an end in 1915 and came to an end, so far as infected rats were concerned, in 1917. What is called the "second human and rodent outbreak" occurred in 1919 with its last human case in 1920 and its last infected rat in 1921. A last, purely rodent infection, originated with the arrival of a ship in the port and the development of a human case on board. Plague on this occasion made its appearance among the dock rats, but no human cases occurred. The last infected rat was found in January 1925 and to-day there is no doubt that New Orleans is free from plague infection. This is a brief account of the plague history of New Orleans.

The measures taken for suppression of and protection against plague are naturally even more interesting than the epidemiology. Three procedures fail to be noticed described as (1) reduction in the number of rats, (2) separation of rats and human beings, and (3) elimination of foci of infection. Reduction was effected by trapping and poisoning, while separation was accomplished by rat proofing, that is to say by the construction of buildings "so that rats had no places in them in which to harbor and escape from their many enemies. Essentially there were three methods: one was to elevate the buildings leaving a clear open space beneath; the second was to build an impervious wall around the ground floor penetrating two feet into the ground and extending above the floor level so as to close all openings into the space between the walls; the third, and most effective procedure, was to lay the ground floor in concrete with a protective wall around the edges, sinking two feet into the ground." An idea of the cost of these operations is given by the statement that during the 3 years of the first outbreak more or

less extensive alterations to more than 150 000 buildings involved a cost to the owners of more than 5,250 000 dollars.

Elimination of foci was accomplished by subjecting the area surrounding a point where an infected rat had been found to intensive trapping, fumigation and, in a few special cases demolition.

Protection against spread of infection to other localities was also attended to. At first freight cars and freight were very carefully inspected, but this was given up as unnecessary. All ships however leaving New Orleans were fumigated to kill rats before departure and at the present time rat proofing and thorough inspection are applied to ships with most gratifying results. Today between 80 and 90 per cent. of the ships that visit United States ports are entirely free from rats and the heavily and persistently infested vessel has become a rarity.

It is hoped and believed that the city of New Orleans will now continue to be free from further plague infection.

W F H

PARDAL (Eduardo) Brote de peste pulmonar en Santa Rosa (provincia de San Luis) [Outbreak of Pneumonic Plague in Santa Rosa (San Luis)]—*Rev Inst Bacteriolg* Buenos Aires. 1935 Mar Vol. 6. No 5 pp 643-650 With 1 map

URIARTE (Leopoldo) ARGERICH (Ricardo) & PASSALACQUA (Ricardo) Una epidemia de neumopeste en 1913 [An Outbreak of Pneumonic Plague in 1913.]—*Rev Inst Bacteriolg* Buenos Aires. 1935 Mar Vol. 6. No 5 pp 651-660 With 1 map French summary

BATTAGLIA (Manuel I) & URIARTE (Leopoldo) Un brote de neumopeste en Merou (prov Entre Ríos) en 1927 [An Outbreak of Pneumonic Plague in Merou (Entre Ríos)]—*Rev Inst Bacteriolg* Buenos Aires. 1935 Mar Vol. 6. No 5 pp 661-667 With 1 map French summary

All three of these communications illustrate the extreme infectivity and the high fatality rate of pneumonic plague. In the first case the history is of a man who probably developed secondary plague pneumonia and who infected some five contacts. These were a hospital attendant, a hospital cook, his nephew, a dweller in a farm opposite the hospital, and indirectly one who had been in contact with the last of these cases.

The second account is of an epidemic, unrecognized at first and diagnosed as influenza or simple pneumonia, which gave rise to 45 deaths in 3 villages probably all who were attacked died, although some of them were treated by serum. The infection was very strictly limited to a few families and ceased with the segregation of all contacts.

In the third outbreak also there was a high fatality rate. Twenty three cases of pneumonic plague were all fatal in spite of aero-therapy and the foci of infection were again limited to members of a family and their attendants.

W F H

URIARTE (L.) & CANAL FEIJÓO (E J) La neumopeste en algunos puntos de la prov de Santiago del Estero [Pneumonic Plague in Santiago del Estero]—*Rev Inst Bacteriolg* Buenos Aires. 1935 July Vol. 7 No 1 pp 42-52. With 1 map & 6 figs. French summary

A description is given of the occurrence of 11 cases of pneumonic plague in the Argentine province of Santiago del Estero. The first

this furnished definitely the plague bacillus, but this positive diagnosis was only forthcoming two days after the death of the patient.

W F H

URIARTE (Leopoldo) MORALES VILLARÓN (N) & AXCHIRAS (Buenos Aires)

Un procedimiento para investigación de la peste en los roedores [Examination of Rodents for Plague].—Rev Inst. Bacteriol. Buenos Aires. 1933. July Vol. 7 No. 1 pp. 5-15. With 1 fig. English summary

Small rodents often arrive at a laboratory in a state of decomposition and it has been an important advance to demonstrate with certainty the presence of the plague bacillus under these circumstances. The procedure developed by the authors is the same as that of Pou in Saigon. Cultures from the bone marrow will furnish pure plague growths even after putrefaction has set in. Marrow is obtained from the diaphysis of the upper end of the tibia or from the femur and tested on tubes of agar and broth, which are incubated at 18°C. The results obtained were excellent.

W F H

URIARTE (Leopoldo) & MORALES VILLARÓN (N) Acerca de la diferenciación del bacilo pestoso [Differentiation of the Plague Bacilli].—Rev Inst. Bacteriol. Buenos Aires. 1933 Nov. 14. No. 2 pp. 287-296. English summary

Ordinarily it is an easy matter to identify the plague bacillus. The authors advise however if there is any difficulty in distinguishing the plague bacillus from other pasteurellas and especially from *P. fimbriata* adding to the carbobyrinic tests those of adonite and rhamnose.

W F H

URIARTE (Leopoldo) & MORALES VILLARÓN (N) Un coccobacilo semiplagioso en las ratas de Buenos Aires. [A Plague-like Cocci-bacillus in Buenos Aires Rats.—Rev Inst. Bacteriol. Buenos Aires. 1933 July No. 7 No. 1 pp. 91-99. With 1 fig. on 1 plate. English summary]

A pasteurella organism has been found in Buenos Aires rats which, although it is non-pathogenic to the rat, is very pathogenic if injected into guinea-pigs and rabbits. This small bipolar coccobacillus may easily be mistaken for plague. It is Gram-negative, indole-positive, non-haemolytic, blackens lead paper, produces neither coagulation nor change of colour in litmus milk and ferments glucose and sucrose but not rhamnose.

W F H

GRARÉ (G.) Présence d'un bactériophage antipesteux chez la *Aenophyllum cheopis* au cours d'une petite épidémie de peste à Tananarive. [Plague Bacteriophage in the Flea].—C. R. Soc. Biol. 1933 Vol. 120. No. 31 pp. 333-334

After having established, in the usual way, the presence of plague in the faeces of rats from a quarter of Tananarive where human cases of plague had appeared a further trial was made of the *A. cheopis* fleas captured on rats of the same quarter. Five experiments were done with 63, 28, 17, 13 and 45 *A. cheopis*, which were ground up, placed in a

bouillon flask at 37°C. and filtered through an L3 candle after 24 hours. A phage was found in the case of the batch of 63 fleas which was as active as that obtained from rat faeces. The other batches proved phage-negative or little active. As a control 73 and 10 cheopis fleas were taken from a quarter of the town with no rat plague and these gave negative results. The existence of a phage in the flea implies that it came from the rat and the fact may have epidemiological importance.

W F H

JOUKOW WEREJNIKOW (N) & FAVORISSOWA (B) Studies on the Nature and Significance of Bacteriophage Phenomena. III. Action of Bacteriophage *in vivo* on Plague Bacilli.—*Rev Microbiol Epidémiol et Parasit* 1935 Vol. 14 No 3 [In Russian pp 119-204 [28 refs.] English summary p 205]

It was found that experimental guineapigs being injected both with a bacteriophage and large doses of plague culture succumbed simultaneously with control animals. In organs of the dead animals a large number of *B. pestis* was found microscopically. No culture however has been recovered till the 5th passage. But guineapigs infected with organs of the dead animals have invariably succumbed. Therefore cases may be when the bacteriophage and the bacilli can live in an organism without a marked reciprocal action. This phenomenon may be explained by the properties of colloids of the organism which prevent this action, as the authors have shown that the normal serum *in vitro* impedes a lytic action of the bacteriophage upon the plague bacilli.

ALAYOV (Fernando) Bacterioterapia na peste (Estado atual da questão)—*Ann Paulista Med e Cirurg* 1935 Dec Vol. 30 No 6 pp 569-572. [15 refs.]

DANZEL (L. A.) La rati-solle scille rouge raticide.—*Ann d Hyg Pub Indust et Sociale* 1935 Dec. Vol. 13 No 12. pp 677-701 With 2 figs (1 map) [18 refs.]

CHOLERA.

RUSSELL (A. J. H.). Recherches sur le choléra dans l'Inde. [Cholera Research in India.]—*Bull. Office Internat. d'Hyg. Publique*. 1938. Jan. Vol. 29. No 1. pp. 58-63.

Active research in cholera is going on at present in India, and will be published in detail in due course. Some indications of the lines of this research and interesting details are given in this publication. The whole population of an endemic zone comprising 10 000 people is under investigation during epidemic and inter-epidemic periods. Altogether 50 000 stool examinations have been made. In the investigation of numerous agglutinable and non-agglutinable vibrio strains by chemical and serological methods it was found that the agglutinable vibrios of healthy persons could not be differentiated by the ordinary biochemical and serological methods from the typical cholera vibrio, but that these same two groups are capable of being separated by their chemical structure.

Some of the epidemiological observations on the test endemic population are noteworthy and the investigation which includes a complete epidemiological history of each individual, has now run for more than a year. Of the 140 cases of cholera which have occurred, 10 per cent. were so slight that they would ordinarily have passed unnoticed. Carriers numbered 3.5 per cent. in the general population, but this figure rose to 9.1 per cent. for recent contacts. The mean duration of carriage was about 30 days. Most of the cases of cholera seemed to have arisen from previous cases and only in 4 was there a strong presumption that the source was a carrier.

Much evidence points to the necessity of intensive study of the non-agglutinable vibrios. In Calcutta during the inter-epidemic period most of the cases of cholera give only non-agglutinable vibrios, whilst the agglutinable vibrio is predominant at the peak of an epidemic. These observations, conducted over 5 inter-epidemic periods, support the contention that non-agglutinable vibrios can give rise to cholera.

Bacteriophage treatment research has been instituted in the hospitals of Calcutta with controls and applies so far to 1,200 cases. Mortality from cholera with ordinary treatment, compared with that of patients receiving cholera phage in addition gave percentages of 18 and 13 respectively. If the reservation were made that the vibro isolated must be agglutinable, these percentages become 20 and 8 respectively a result still more favourable to the employment of phage treatment.

One final point of interest is contained in the statement that the cholera toxin is not an endotoxin but an exotoxin with an extremely small molecule and easily destroyed.

W F Harry

SCHÖBL (Otto) & NUKADA (Akio) Versuche über Fische als Choleraträger [Fish as Cholera Carriers.]—*Kikusaku Ank. Experim. Med.* 1935 Oct. Vol. 12. No. 4. pp. 313-323.

Fish form part of the daily diet in Japan and may be eaten raw. Any suggestion therefore that fish may under certain circumstances, be carriers of the cholera vibrio is a matter of grave concern to public health authorities. The trials here undertaken were of the nature of feeding experiments and determination of the length of stay of cholera

vibrios in the gastro-intestinal tract. Infected food was given to carp by means of a stomach sound. Faeces were examined by removing the test material with the fish out of water. Cholera vibrios could be found in the intestine up to the sixth day which is just about the length of time food remains in the body. They could be isolated in pure culture most easily from the stomach where the reaction is alkaline. On one occasion the vibrio was isolated from the faeces on the 17th day and on one occasion from the gall bladder. On the experimental findings the author concludes that fish are not to be regarded merely as mechanical agents but as potentially real carriers of the cholera vibrio.

W F H

KUBOTA (Kazuo) Epidemiological Observation of Cholera in Formosa.—
Taiwan Igakkai Zasshi (*Jl Med Assoc Formosa*) 1935 Nov
 Vol. 34 No 11 (368) [In Japanese pp 1791-1841 With 13
 charts. [58 refs] English summary pp 1841-1843]

RICK (E. M.) A Preliminary Epidemiological Study of Cholera with Special Reference to Assam and Suggestions for Further Investigations.—*Indian Jl Med Res* 1935 Oct. Vol. 23 No 2 pp 467-473 With 1 graph

LAHIRI (S. C.) A Preliminary Report on the Study of Coagulation Time of Blood in Cholera Cases.—*Jl Indian Med Assoc* 1935 Dec.
 Vol. 5 No 3 pp. 89-99 With 6 figs.

The method used to determine coagulation time was to fill a capillary tube with finger blood and to break off the end of the tube every 15 seconds until a fibrin thread made its appearance. Normally coagulation time by this method which was carried out at room temperature was found to be 3 to 5 minutes. Altogether 116 cases of cholera were studied and it was found that there was shortening of the coagulation time in most cases. This alteration in time shifted towards normal with the improvement of the patient. Although the coagulation time of the blood roughly followed the same course as the specific gravity it was independent of it and was indeed a more reliable index of the general condition of the patient.

W F H

SONA (Y) & collaborators. Sur le délai dans lequel les selles doivent être examinées pour la recherche du vibron cholérique. [Admissible Delay in Examination of Stools for Cholera.]—*Bull Office Internat. d'Hyg. Publique* 1936. Jan Vol. 28. No 1 pp 64-66.

These experiments on the survival of cholera vibrios were carried out with the stools of cholera patients and with artificial stool mixtures. The conclusions arrived at are that —(1) at least 5 gm. faecal matter are required in an examination for carriers (2) this faecal matter should have been obtained in the 24 hours preceding examination and (3) it should have been kept at a low temperature. Moreover it is necessary under the conditions of quarantine in ports that the medical officer on board ships should sow the stools in peptone water or that a small quantity of faeces, taken within 24 hours of arrival should have added to them 10 cc. of peptone water at about pH 8.4 and be kept at a low temperature.

W F H

SEAL (S. C.) Difficulties in the Bacteriological Diagnosis of Cholera Vibrios.—*Indian Med. Gaz.* 1935. Nov. Vol. 70. No. 11. pp. 614-620. With 10 figs. on 2 plates. [18 refs.]

Workers who are faced with the constant difficulties of identification of the cholera vibrio or in other words, the separation of the true cholera vibrio from the cholera-like vibrio will find in this publication a very useful account of the cholera variants which present themselves in practice. They are considered under the headings—morphological, cultural, biochemical and serological characters; animal experiments and phage lysability. Some excellent plates accompany the text descriptions. No specific conclusion as might have been expected, is reached. "The position as regards the so-called atypical forms of cholera vibrios is still unsettled. In a disease that is considered to be water-borne, the problem of the extracorporeal existence of cholera vibrios, e.g., in water is as important as that of human carriers. Agglutinable vibrios will probably in future have to be included in the aetiological factors of cholera." W F H

WHITE (P. Bruce). The Relation of Specific Carbohydrates to Roughening in *V. cholerae*.—*Jl. Path. & Bact.* 1935 Nov. Vol. 41. No. 3. pp. 567-568.

The author considers that his long work on the nature of roughening justifies him in maintaining that this phenomenon represents the reduction or loss of specific smooth carbohydrate, and the appearance of a second, rough carbohydrate, which had remained masked by the S vibrio. An opposing view is that the second carbohydrate is not preexistent but a positive transformation peculiar to roughness.

W F H

WHITE (P. Bruce). The Q Proteins and Non-Specific O-Antigens of the Cholera Vibrio.—*Jl. Hygian.* 1935 Dec. Vol. 35. No. 4. pp. 498-503.

The object of this note was to investigate the characters of the Q cholera proteins and incidentally to show that they were identical with, or an important constituent of, the non-specific O-antigen of GARDNER and VENKATRAMAN [this *Bulletin*, 1935, Vol. 32, p. 789]. Another identity which seems probable is that of the total Q fraction with the "acid-soluble A substance" of LINTON and his co-workers. These Q proteins are alcohol-soluble antigens, capable of fractionation into 2 parts Q₁ and Q₂, the former is obtained by treatment of the total Q fraction with alkaliified water and the latter by precipitation "from an aqueous suspension of the residue with HCl." Their importance in relation to the specificity of vibrios may be summarised in the author's own words—

Vibrios heated at 100°C. in saline suspension agglutinate in a generalised manner and often to a high titre with the antisera of the Q proteins of the cholera vibrio. The antibodies concerned are not inactivated by the carbohydrate fraction of *V. cholerae*. Occasional strains of vibrio react similarly in the living state with these Q (cholera) agglutinins. The antiserum of the Q₁ substance of S *V. cholerae* seems to possess agglutinating properties additional to those of anti-Q₁ and anti-Q₂ R sera, rather more specific and possibly related to "carbohydrate receptors." There is reason to believe that the Q proteins are true constituents of the living

vibrio and are not serological artefacts due to reagents and heat. It seems that these substances and their antibodies are important contributors to the non-specific O agglutination of vibrios recently discussed by Gardner and Venkatraman

W F H

DOORENBOS (W) Sur la présence d'hémolysines dans les jeunes cultures du vibron cholérique. [Haemolytic Power in Young Cholera Cultures.]—*C R Soc Biol* 1938 Vol. 121 No 2. pp 128-129

Twelve strains of cholera vibrio obtained from fatal cases of cholera and showing typical morphological and biological characters were tested for their haemolytic power after 8 hours and 24 hours growth. Of the 8-hour growths 4 possessed strong 5 a feeble and 3 no haemolytic power while none of the 24-hour growths showed any haemolytic power at all.

W F H

TAYLOR (J) & AHUJA (M. L.) Serological Variations in Vibrios from Non-cholera Sources.—*Indian Jl Med Res* 1935 Oct. Vol 23 No 2. pp 531-544

In continuation of their previous work on the development of the serological characters of *V cholerae* by an agglutinable vibrio the authors have experimented with three strains of vibrio having no relation to the cholera vibrio. These strains were (a) *V mactaksoni* (b) an inagglutinable water vibrio and (c) an inagglutinable vibrio from a healthy individual in an endemic cholera area. By intraperitoneal passage in mice and the preparation of cultures from the heart blood of these animals two types of colony began to emerge in all three strains. One colony was somewhat opaque and the other translucent. It was found that while the opaque colony corresponded to the original type strain the translucent colony gave the typical biochemical and serological reactions of *V cholerae*. In one respect however a difference was found separating these strains from the cholera vibrio. The chemical structure of the three strains and also of their variants as determined by their protein and carbohydrate fractions differed from that found in the case of the agglutinable vibrios isolated from cholera cases in India. Thus there has been brought about a laboratory transformation in essential particulars of a non-cholera to a cholera vibrio

W F H

LINTON (Richard W) MITRA (B N) & MULLICK (D N) Respiration and Glycolysis of the Cholera and Cholera-like Vibrios.—*Indian Jl Med Res* 1938 Jan. Vol. 23 No 3 pp 589-599

Even when serological and haemolytic tests fail to differentiate cholera from cholera-like vibrios there remain other tests, and particularly chemical analyses which may effect a separation. Metabolic activities as is shown in this article may assist in the differentiation by taking account of respiratory and glycolytic activity. In this method suspensions of 18-hour growths were prepared in Ringer's solution containing 0.1 per cent. glucose only for the respiration experiments and 0.1 per cent. glucose plus 0.1 per cent. NaHCO_3 for the glycolysis experiments. Respiration is given in c.mm. of oxygen consumed per mg of bacteria, and glycolysis in c.mm. CO_2 given off per mg of bacteria.

The work " has shown that metabolism is most active in the group of vibrios isolated from cases of cholera and belonging to group I. In the members of group II the metabolic activity is less than in the first group and in group III is even less, although these two groups overlap in respect to respiration. The El Tor group IV is sharply marked off from the others by the fact that while its respiration is equal to that of group I its aerobic glycolysis is negative. In this way for other groups differences are established on the basis of metabolism. In general a correlation has been found to exist between metabolism, chemical structure and source of the strains for groups I to VI.

Changes from agglutinability to haemagglutinability are always accompanied by a lowering of metabolic activity as is also the change from smoothness into roughness.

W F H.

DOORENSPOEL (W.) Sur la variation du pouvoir hémolytique du vibron El Tor [Variation of the Haemolytic Power of the El Tor Vibrio].—*C R Soc Biol.* 1936, Vol. 121, No. 2, pp. 130-132.

Just as in the case of cholera vibrios young 8-hour growths of El Tor vibrios proved more haemolytic than the 24-hour growth and one strain actually gave no haemolysis in 24-hour growth. This non-haemolytic strain was an interesting one. It was isolated from a case of diarrhoea with agglutinable vibrios in the stools. Among 40 agglutinable colonies on an agar plate sown from the stool of this patient there were found three which were non-haemolytic. On examination these three strains proved to be partially haemolytic after only 6 to 8 hours cultivation, that is to say they behaved like the cholera vibrio.

It seems probable then that there are strains between the classical strongly haemolytic El Tor vibrio and the non-haemolytic cholera vibrio which must be placed in an intermediate haemolytic category.

W F H.

SCHOLTESS (R. T.) Analyse des récepteurs du vibron cholérique et du vibron El Tor.—*Arch. Inst. Pasteur* 1936, Jan., Vol. 55, No. 1, pp. 63-75. [See also this Bulletin, 1934, Vol. 31, p. 31; 1933, Vol. 31, p. 771.]

Mitra (B. N.) Recombination of the Proteins of *Vibrio cholerae* and Related Organisms. Part I. The Diamino Acids. Part II. The Monoamino Acids.—*Indian Jl. Med. Res.* 1936, Jan., Vol. 22, No. 3, pp. 573-578. [17 refs.] 579-588. [11 refs.]

Linton (Richard W.) Mitra (B. N.) & Seal (S. C.) Further Notes on the Cholera and Cholera-like Vibrios.—*Indian Jl. Med. Res.* 1936, Jan., Vol. 23, No. 3, pp. 601-607.

BANERJEE (Dhirendra Nath) Is Cholera Kidney a Form of Nephrosis?—*Jl. Indian Med. Assoc.* 1936, Jan., Vol. 5, No. 4, pp. 160-161.

In some respects the pathological, biochemical and clinical features of cholera may show certain characters in common with nephrosis, as

defined by VOLHARD and FAHR. If these be set aside and only the differential characters emphasized, it is found that whereas in nephrosis there are no changes in the glomeruli, its course is chronic, oedema is early and constant, no retention of nitrogenous waste products occurs and there is no uraemia the reverse is the case in cholera. Thus the cholera kidney is not to be regarded as representing a nephrosis.

W F H

TAYLOR (J) AHUJA (M L) & GURKIRPAL SINGH Experimental Observations on Cholera Vaccine—*Indian Jl Med Res* 1936 Jan Vol. 23 No 3 pp 609-617

Actual protection experiments are the best test of the efficacy of a vaccine. The infection test in this case was an intraperitoneal injection in guinea-pigs of a smooth agglutinable heterogeneous strain of *V cholerae*. It is ordinarily accepted that cholera vaccine should not be used more than six months after the date of manufacture. The importance of these trials which show the possibility of a much longer period of preservation is obvious. Another point of great importance investigated has a bearing on quarantine regulations and on the shortest time within which a sufficiently high degree of immunity is developed in the vaccinated individual. The authors find (1) Cholera vaccine preserves full immunizing potency up to two years even when exposed to high hot weather temperatures (2) Immunity does not seem to be effectively developed, after inoculation before the 5th or 6th day and is still higher by the 8th to 10th day (3) Maximum protection is obtainable with strains of the characteristic prevailing serological type obtained from actual cases of cholera and showing H and O agglutination to a typical cholera vibrio serum, in this case the original Japanese type serum. In contrast with this it was found that agglutinable strains from carriers and agglutinable variants from strains of origin other than cholera cases give a lower degree of protection.

W F H

SUCINO (Kouhei) The Antigenic Properties of the Cholera Vaccine prepared by the Philippine Bureau of Science.—*Philippines Jl Sci* 1935 Oct Vol. 58 No. 2 pp 153-161

The organism which is used in the Philippines for prophylactic vaccination against cholera was isolated several years ago from a fatal case of cholera and is known as strain No 22. Its antigenic character has not been tested and thus forms the subject of the present enquiry. The organism was non-motile possessed a typical comma like appearance produced a pellicle on peptone water after several transplantations gave the cholera red reaction and fermented glucose maltose and saccharose but not mannite.

Immunological efficiency was tested by animal protection tests. Guinea-pigs were immunized by intraperitoneal inoculation and were then tested by intraperitoneal injection of lethal doses of a number of cholera strains. Protection was afforded against these strains. It may be concluded from these experiments that the cholera vibrio (strain 22) which is unique in its inability to ferment mannite and in its non-motility protects effectively against various strains of cholera vibrio.

W F H

KAPUR (N. C.) A Plea for the Use of Concentrated Saline in Cholera.
 [Correspondence.]—*Indian Med. Gaz.* 1935 Aug Vol. 71
 No. 8. pp. 479-480.

The suggestion put forward in previous correspondence [this Bulletin, 1935 Vol. 32, p. 764], that the efficacy of treatment of cholera by hyper tonic salt solution lay more in the action of the salt than the supply of fluid, is here combated and the opinion advanced that "the administration of fluid plays almost as important a rôle as that of salts and alkalies." This restatement of the original doctrine is based on the extensive experience at the Campbell Hospital, Calcutta. W F H

BANERJEE (Dhirendra Nath) & DATTA (Sunil Krishna) Softer Lactate in the Prevention and Treatment of Cholera Acidosis.—*Jl. Indian Med. Assoc.* 1936. Jan. Vol. 5 No. 4 pp. 168-169.

The bicarbonate-carbonic acid ratio is considerably altered in cholera. Factors which favour the development of acidosis are the dehydration of the tissues, the excessive loss of base in the frequent stools and the effect of toxin in the production of excess acid. Treatment designed to restore the bicarbonate-carbonic acid ratio consists in administration of fluid to overcome dehydration and stimulate diuresis and the use of alkali, usually sodium bicarbonate in large doses. Some distinct disadvantages accompany the use of large doses of sodium bicarbonate intravenously and the author has replaced it successfully with sodium lactate in a dose of 10 cc. of the molar solution per kilogram of body weight. The lactate ion is transformed to glucose and the sodium ion liberated combines with the excess of carbonic acid to form a rapid supply of bicarbonates. In this way acidosis is overcome without any precipitation of an alkalosis. W F H

VENOMS AND ANTIVENENES

MARTIN DEL CAMPO (Raphael) Nota acerca de la distribución geográfica de los reptiles ponzoñosos en México [The Geographical Distribution of Poisonous Reptilia in Mexico]—*An Inst Biol Mexico* 1935 Vol. 6 Nos. 3 & 4 pp 291-300 [46 refs] English summary

Forty six species of reptiles were investigated in Mexico as regards their geographical distribution. Fourteen species of coral snakes the *Micruurus* genus of *Elapidae*, occur generally in the country a marine snake *Pelambydrus platurus* all along the Mexican Pacific southward from the Gulf of California three species of *Ancistrodon* (*Crotalidae*) *A. bilineatus* locally known as cantil and freno along most of the Pacific coast and two others *A. piscivorus* (water viper) and *A. contortrix* (copper-head) on the northern frontier. *Sistrurus* is represented by two species *S. catenatus edwardsii* in the north at Sonora, Tamaulipas and perhaps Durango and *S. rarus* in wooded districts and the warm and humid lowlands and eastern slopes of the Central Plateau. Sixteen species of rattlesnake *Crotalus* occur in various parts of Mexico some in hot dry lands others in hot moist districts. Eight species of *Bothrops* are found in the moist hot, wooded regions of the east and south-east. Finally two species of *Heloderma* or poisonous lizard, *H. horridum* and *H. suspectum* ('Gila monster') are known the former being met with in the west and south and the latter chiefly in the south-east but may be seen almost anywhere along the Pacific slope.

H H S

PEPEU (F) Studi sull'ofidismo nelle Colonie Italiane. [Snakes in the Italian Colonies.]—*Tropia* 1935 Dec. Vol. 25 No 193. pp 353-363 With 12 figs. (9 on 4 plates) [20 refs.]

The following snakes are met with fairly frequently and are consequently of practical importance for production of suitable antivenene for treatment particularly important now that military operations are being undertaken —

VIPERIDAE In Libia *Cerastes cerastes* *C. vipera* and *Echis carinatus*

In Eritrea *E. carinatus* *Bitis arietans* *Atractaspis irregularis* *A. magrettii*

In Somalia *E. carinatus* *B. arietans* *A. engdaensis* *A. leucomelas* and *A. microlepidota*.

COLUBRIDAE *Naja haje* in all three and *N. nigricollis* in Eritrea and Somalia.

Some idea of the relative frequency of the chief snakes may be obtained from the captures made during 4½ months in Tessenei (south of Kassala near the border between Eritrea and the Anglo-Egyptian Sudan). *Echis carinatus* 513 *Naja nigricollis* 11 *Naja haje* 10 *Bitis arietans* 4 *Atractaspis magrettii* 1

H H S

GITHENS (Thomas S) Studies on the Venoms of North American Pit Vipers.—*Jl. Immunology* 1935 Aug Vol 29 No 2 pp 165-173

Twenty-six species of snakes were studied, the following points being specially investigated (1) The amount of venom obtained by

and West African species) *B. coudalis* (Horned adder) *B. arietans* (Berg adder) and *Causus rhombatus* (Night adder). They also state the average yield of venom of each and their relative toxicities in animals such as the mongoose (*Herpestes paleaenoides*) Meerkat (*Suricata tetradactyla*) Black-spotted Genet (*Genetta tigrina*) American grey squirrel (*Sciurus carolinensis*) and in frogs and scorpions.

Discussing the toxic and antigenic properties of the chief of these venoms they conclude that for general use in South Africa where the inhabitants are sparsely distributed antivenenes to the two commonest—the Cape cobra and the Puff adder—are most needed. Preparation of such antisera has been greatly facilitated by using detoxicated concentrated solutions and antivenenes obtained by action of formalin for immunization of horses. This is done by injecting the mixed antigens over a period of 7 weeks. From experiments in rabbits it was found that 1 cc. of the concentrated serum will neutralize after an hour's contact 2 mgm. Cape cobra venom, the same of *N. nigricollis* and *N. haje* 2.2 mgm. of *Dendroaspis* and 1.75 of *Spodon*, 9.0 of *Bitis arietans* 11.0 of *B. coudalis* and more than 25.0 mgm. of *Causus rhombatus*. Strange to say it is ineffectual against the Gaboon adder venom, although it is classed *Bitis*. Clearly its venom is antigenically basically different from that of the Puff adder (*Bitis arietans*). Although it is rarely met with, the venom from this snake might usefully be incorporated, if this could be done without injuring the neutralizing properties of the other two.

H H S.

CHARRI (E.) & BOQUET (Paul). Recherches sur les antigènes des venins et les anticorps des sérums antivenimeux. Deuxième article. Venin de *Crotalus cerastes* et sérums antivipérins (*C. cerastes*). [On the Venom and Antivenoms of *Crotalus cerastes*.]—*Arch. Inst. Pasteur* 1936. Feb. Vol. 56. No. 2. pp. 171-185.

In a former article the authors reported the results of a similar investigation on *Vipera aspis*. In the present they deal not only with the venom and antivenene of *C. cerastes* but also with the action of *cobra* venom with *Crotalus* antivenene and vice versa.

Speaking first of the venom of *C. cerastes* the authors estimated its toxicity *in vivo* on rabbits, guinea-pigs and mice. Intravenous injection of 0.5 mgm. killed rabbits in 1-2 minutes, 0.45 mgm. had no effect estimable clinically. Subcutaneously at least 6 mgm. were needed to kill and that in 10-12 hours. The results in guinea-pigs were more variable. 0.5 mgm. intravenously killed in less than 2 minutes, 0.4 and 0.3 mgm. in $\frac{1}{2}$ to 3 hours smaller doses might not prove fatal at all, but on the other hand, 0.1 or even 0.05 mgm. might kill in 12 minutes or so other animals might show paralysis of the hind limbs with dyspnoea and then recover or die suddenly. Subcutaneously at least 6 mgm. were necessary to cause death, more than that is, than in the case of the rabbit. In mice, death occurred in 1-2 minutes after intravenous injection of 0.04-0.1 mgm., many withstand 0.02 mgm. and with the larger dose some survive for $\frac{1}{2}$ hour. Subcutaneously 0.3 mgm. will kill in about 12 hours higher doses such as 1.0 mgm. do not shorten the period.

The authors next estimated the coagulating power *in vitro* and found that 0.0025 mgm. produce clotting of 2 cc. horse plasma in 15 minutes. Horse plasma was found more sensitive to *Crotalus* venom than that of cattle or sheep (the opposite was observed with *V. aspis* venom).

Above 60°C. the coagulant action is lessened and at 80°C. abolished. The haemolytic effect was determined and 0.00035 mgm. was needed to haemolyse 1 cc. of horse's red cells a little more than had been found in the case of *V. aspis* venom. Sheep cells appeared to be refractory.

Antitoxin potency was estimated in the rabbit only. (1) The *Cerastes* antivenene neutralized from 2 000-5 000 units. (2) *V. aspis* antivenene had a titre of 9,500 against the homologous venom but only 200 against *Cerastes cornutus* venom. (3) *Cerastes* antivenene with a titre of 5 000 against its homologous venom had one of 570 against *V. aspis* venom.

The anticoagulant antihaemolytic, precipitating and flocculating properties were also investigated, and it is noteworthy that with regard to the last flocculation appeared more often in mixtures of *aspis* venom and *Cerastes* antivenene than with homologous sera.

The authors' findings may be summarized thus—The antitoxic potency of *Cerastes* antivenenes is not very closely parallel with their protective properties against coagulation and haemolysis nor with the reactions of precipitation or flocculation. In the present state of knowledge only *in vivo* tests enable one to judge of the potency of anti-viperine sera. *Cerastes* antivenene completely neutralizes the homologous venene, but only to a small degree counteracts the effects of the coagulant in *V. aspis* venom, and vice versa.

H H S

ZANETTIN (Giuseppe) Osservazioni sulle lesioni oculari determinate dal veleno della *Naja nigricollis* in Eritrea. [Ocular Effects resulting from the Poison of *Naja nigricollis* in Eritrea.]—Arch Ital Sci Med Colon 1935 Dec. Vol. 16 No 12 pp 856-858.

One of the results of *Naja nigricollis* ejecting its venom into the eyes is said to be blindness, but from the two cases here recorded this would seem to be unusual. The first case was a man of 35 years who turning over stones unexpectedly came across a *Naja nigricollis* which from a distance of 40 cm. spat poison into his eyes. He was promptly given Calmette's antivenene and sent to hospital. There was much pain and photophobia, the conjunctiva was strikingly pale especially that of the lower lid and fornix. The next day there was a little discharge but no further symptoms developed and there was no constitutional disturbance. The second case was similar except that no antivenene was given, recovery however was equally rapid, 3 days.

The poison would thus appear to have a proteolytic acid leading to a local necrosis of the conjunctiva. Seeing that general symptoms, usually severe in bites by this snake were absent, either very little poison reached the eye or else absorption is practically nil. H H S

KELLAWAY (C. H.) & WILLIAMS (F. Eleanor) Antigenic Differences between the Venoms of the Tiger Snake *Notechis scutatus* and the Black Tiger Snake *Notechis scutatus* var *niger*.—Australian Jl Experim Biol & Med Sci. 1935 Mar 16. Vol. 13 Pt. 1 pp 17-21

The venom of the *niger* variety of tiger snake *Notechis scutatus* is less toxic than that of the banded tiger snake itself but is a more powerful coagulant, both *in vitro* and *in vivo*. Further study of their antigenic differences has been made possible by the preparation of fractions of

these venoms. Univalent antivenene was prepared by injection of the venom of the typical banded form, and this was mixed with varying doses of the venoms and fractions—the mixtures after standing for an hour at room temperature were then injected into guineapigs. One cc. of the antivenene was found to neutralize approximately 0.4 mgm. of tiger snake venom, 0.2 mgm. of the corresponding thrombin-free fraction, and 0.29 mgm. and 0.15 mgm. respectively of the venom and thrombin-free fraction of the black variety of snake. In terms of lethal dose per 100 gm. of guineapig, 1 cc. antivenene neutralized about 200 doses of tiger snake venom, 103 of the thrombin-free fraction, and 49 and 28 respectively of the black tiger snake venom. A second sample neutralized 163 lethal doses of tiger snake venom, 40 of black tiger snake venom, 17 of copperhead venom, 13 of the venom of brown snake, 3 of cobra and 1.6 of death adder venom. Marked cross protection had been found between the venoms of tiger snake and copperhead in guineapigs, and these animals actively immune to two lethal doses of death adder venom resisted 8 I.d. of copperhead and 10 of tiger snake venoms.

The authors then tested the neutralizing power of sera of rabbits immunized with thrombin-free fractions of the venoms, and found that they gave a higher proportional protection against this fraction and against black tiger snake venom than does antivenene prepared against the entire venom while similarly sera of rabbits immunized with the thrombin-free fraction of the black variety snake venom give greater protection against whole tiger snake venom and its fraction. The thrombin free fractions are antigenically different. The venom of the black variety is less toxic than that of the type when subcutaneously injected, but this does not depend on its more potent thrombin.

H H S.

WATAKARE (Osamu) Basic Substance in the Formosan Snake Venoms.—*Taiwan Igaku Zasshi* (*Jl. Med. Assoc. Formos.*) 1935 Dec. Vol. 34 No. 12 (369) [In Japanese pp. 2083-2087 With 3 figs. on 1 plate. [10 refs.] English summary pp. 2087-2088.]

" 1. In various kinds of Formosan snake venoms there may be found a substance that forms a nearly insoluble crystalline salt with flavianic acid. The formation of the crystals takes place even in a few drops of a very diluted solution of the venom, say for instance a 1:1,000 solution of the dried venom. It can be seen under the microscope shortly after the reagent, a 10 per cent. aqueous solution of flavianic acid, is added. A similar reaction follows upon the addition of peric acid, but this reagent is not suitable for the microscopic demonstration of the base because the primary precipitate appears in the form of a nearly amorphous powder.

" 2. The base is especially abundant in the venoms of the Taiwan-Haba (*Trimeresurus macropsalis* Cantor) and the Ao-Haba (*Trimeresurus griseus desjardinii* Schmidt) and is contained in an appreciable proportion in the venom of the Kusari-haba (*Vipera russelli formosensis* Maki) whereas the venoms of the Hyppo da (*Agiastroides acutus* Günther) and the Okinawa Haba (*Trimeresurus flavoviridis flavoviridis* Hallowell) contain little of it.

" In contrast to these Crotalid and Viperid venoms the Elaphe venoms at least those of the Taiwan-Cobra (*Naja naja sara* Cantor)

and of the Amagama hebi (*Bungarus multicinctus* Blyth) seem not to contain this basic substance.

Whether or not these crystal-forming bases contained in the various venoms are all or in part identical cannot be decided at present. Likewise it remains yet uncertain whether they are toxic or not or toxic in the same degree. In any case it seems to be a very interesting problem from the standpoint of comparative chemistry to ascertain their presence or absence in as many kinds of snake venom as possible and to study the chemical and physiological properties of the isolated bases. This may prove of interest also to the zoologist and the toxicologist.

3 0.5 g. of the dried venom of the Taiwan Habu yielded 0.19 g. of the picrate. In its atomic composition the base corresponds to $C_8H_{14}N_2$, and in some of its properties it resembles cadaverin but is in the author's opinion, different from the latter substance. Although its physiological effects are yet unknown it is not likely to be of a highly toxic nature.

SHORR (H. E.) & MALLICK (S. M. K.) Detoxication of Snake Venom by the Photodynamic Action of Methylene Blue.—*Indian Jl Med Res* 1935 Jan. Vol 22. No 3 pp. 529-538.

In this investigation the authors used venom of *Daboia* (*V. russelli*) and as experimental animals pigeons of 290-310 gm. weight. The minimum lethal dose having been ascertained as 0.03 mgm. the first experiment was undertaken to determine whether this venom was detoxicated by the photodynamic action of methylene blue in a dilution of 1 in 100 000 and the result was definitely positive. They next proposed to determine the effect of varying the time of exposure from 1½ to 17 minutes using the same dilution of methylene blue and 80 lethal doses of *Daboia* venom in 1 cc. The mixture proved fatal after only 6 minutes exposure but not after 10½ minutes. Next the action of the methylene blue in constant strength was tested, while the strength of the venom was varied and, in accordance with expectations increasing the strength of venom called for longer exposure for detoxication. As a corollary of this, the venom was used of constant strength (10 m.l.d.) and the methylene blue dilutions varied from 10^{-4} to 10^{-6} and the first was found to have the strongest action. Further variations were made in the strength of the methylene blue using 20 m.l.d. of the venom and the optimum concentration of the dye was found to be 1 in 50 000. The detoxication by the photodynamic action of methylene blue was shown to destroy the antigenic properties of the venom.

H H S

- i. TAYLOR (J.) & MALLICK (S. M. K.) Observations on the Neutralization of the Haemorrhagic of Certain Viper Venoms by Antivenene.—*Indian Jl Med Res* 1935 July Vol. 23. No 1 pp. 121-130
- ii. — & ARUJA (M. L.) The Coagulant Action on Blood of *Daboia* and *Echis* Venoms and Its Neutralization.—*Ibid* pp. 131-140
- iii. — & — Observations on Poisoning with the Venom of *Echis carinatus* and Its Treatment with a Heterologous Antivenene.—*Ibid* pp. 141-146 With 1 plate.

This article though short gives an account of work of considerable scientific value and of much practical importance and must have entailed

much careful research. The authors investigated the following —(a) *The relationship of the anti-haemorrhagic titre to the toxic titre of V russelli antivenene*. Protocols giving the results of many tests are reproduced, and it is seen that there is "a marked parallelism between the neutralization of the lethal effect of the venom by the serum and the results of the skin haemorrhagin test." (b) *The neutralization of the haemorrhagin of viper venoms by heterologous antivenenes*. *V russelli* antivenene was tested against the haemorrhagin of *Echis carinatus* and *V berus* venoms. The antivenene of the African puff adder *Bitis arietans* was tested against the venoms of the other three. It is shown that the viper venom haemorrhagins are neutralized by the other antivenenes probably therefore the haemorrhagin fraction is of the same nature in all. (c) *The toxicity of viper venoms after their haemorrhagin has been neutralized by heterologous antivenenes*. This was of special importance because the toxicity of viper venoms has been ascribed to their haemorrhagin. The authors found, however that in the case of *V russelli* and the others neutralization of the haemorrhagin does not diminish the m.i.d. as gauged by the intravenous test. Hence it follows that if death is due to the neurotoxin of the venom, heterologous antivenenes will be ineffective in treatment, though they may neutralize the haemorrhagin fraction.

ii. The authors have tested the coagulating action of the venoms mentioned on whole blood *in vitro* and also their action *in vivo* injecting by different routes and in varying doses. In some cases intravascular clotting has been observed, in others total absence of clotting; these contrasting effects call for explanation, and this is the object of the present study. As regards the coagulant action of the venom of *V russelli* the authors confirmed the work of MACFARLANE and Burgess BARNETT: the action of *E carinatus* venom is less though still marked with cobra venom the coagulant action is small though in high concentrations the rate of coagulation is increased somewhat. They also tested the neutralization of the coagulant action of venoms by homologous and by heterologous antivenenes. As the result of investigating the coagulant effect of viper venoms *in vivo* the authors found that —

(1) When a relatively high dose of the venom is given death may occur with extensive intravascular clotting. This is only seen when death occurs within a few minutes of injection of the venom. The tendency to massive intravascular clotting varies in different species and in individual animals.

(2) Extensive intravascular clotting does not always occur when a dose approaching that which can be considered the minimum lethal dose is given, even when death occurs in two or three minutes after injection.

(3) When death is delayed beyond a few minutes extensive intravascular clotting does not occur although small fragments of soft clot may occasionally be found in the heart.

(4) In the case of delayed death from the action of *aspidos* and *Echis* venoms or when sub-lethal doses have been given, the blood is fluid at death. This is also seen when the animal is killed within three days of the injection of venom."

The coagulant actions of the venoms of *V russelli* and *E carinatus* are neutralized by their homologous antivenenes, but there is no reciprocal heterologous action. Further when death occurs rapidly intravascular clotting may not be seen, and if survival takes place the blood is incoagulable for a time, gradually returning to normal. Rapid action may produce massive clotting of the blood *in vitro* while slower action leads to defibrillation of the blood with deposit of the fibrin on the vessel walls and thereby renders the blood incoagulable.

iii. Details of the symptoms during life and the findings post mortem of monkeys dying from poisoning from experimental subcutaneous injection of the venom of *E. carinata* are described. The results of treatment by cobra and *V. russelli* antivenenes confirm what has been stated above viz that though the haemorrhagin may be neutralized other constituents of the venom are not. They therefore reduced the incidence of haemorrhagic symptoms and may consequently be beneficial to a certain degree when homologous antiserum is not procurable.

H H S

CHOPRA (R. N.) CHOWHAN (J. S.) & DE (N. N.) An Experimental Investigation into the Action of the Venom of *Echis carinata*—*Indian Jl Med Res* 1935 Oct. Vol. 23 No 2 pp 391-405 With 5 figs. [25 refs.]

An article of much interest and full of detail. *Echis carinata* has been stated half a century ago to be third in the order of poisonous snakes of India, followed by *Daboia* (*V. russelli*) the banded krait (*Bungarus fasciatus*) and the king cobra. The authors' experiments however do not support this view. They tested the action of *Echis* venom on lower forms of life such as *Paramoccum caudatum* then on frogs, guineapigs, mice, cats and rabbits. The effects on the latter as regards blood pressure the heart muscle the blood itself—coagulation or haemolysis—the respiratory system, unstriped muscle (uterus, intestine) and the nervous system were carefully observed and recorded.

The authors found that the venom of *E. carinata* was less toxic than that of *V. russelli* or the cobra at all events it was slower in action because absorption is delayed (though sudden death will result if the venom is injected directly into a blood vessel). Locally there is inflammation with oedema and perhaps gangrene bleeding occurs from the mucous membranes. The venom contains enzymes albumoses and globulins. Thrombin is present in large quantities. Splanchnic vessels are dilated and the abdominal organs become engorged, the peripheral vessels may constrict to counteract the fall in blood pressure but if the dose of venom is large death occurs in collapse. The fall of blood pressure is not central, nor of cardiac origin. It acts on the intima of blood vessels leading to the extravasation of sero-sanguineous fluid. Haemorrhagins are at least ten times as strong as that in *V. russelli* venom and a coagulant ferment weaker than in the latter. There is also a neurotoxin present. It has no marked action on the respiratory centre the effect in this regard being probably secondary to fall of blood pressure and failure of blood supply. It has a marked curara-like action on nerve endings. Death is due primarily to circulatory failure analogous to that in histamine shock. In delayed poisoning there may be complete failure of the higher controls and cutting off of all central impulses to the periphery due to the curara-like action of the venom on the motor end-plates.

H H S

BERRENS (Julien) & CUYPERS (Hubert) Action du venin de cobra sur la circulation. [Action of Cobra Venom on the Circulation.]—*Bruxelles-Med* 1935 May 12. Vol. 15 No 28. pp 757-771 With 13 figs. [47 refs.]

The species of cobra whose venom was employed in this study is nowhere mentioned, but the unit is the minimum needed to kill a mouse of 20 gm. in 5-7 hours i.e. about 0.01 mgm. The fatal dose

killing a rabbit in 24 hours was found weight and for a guineapig 0.004 gm. respectively

The authors investigated the blood pressure following intravenous injection in a rabbit. This was found to produce a transient fall at times preceded by a slight rise due to a reflex via the nerves of Herbst. The fall occurs even after section of the vagus. It is to be due to a reflex via the nerves of Herbst. The toxicity of viper venoms is known. The authors found, however, that the venoms of the other vipers tested against the haemorrhagins of the African snakes are neutralized before the haemorrhagins are neutralized. The antivenenes of the African snakes are neutralized by heterologous antivenenes. The antivenenes of the African snakes are neutralized by heterologous antivenenes.

VELLARD (J) & MICHELLE VEAUX (M) Modifications provoquées par les venins ophidiques (the venom is less than 1% of the total weight of the snake).—*Ann Inst Pasteur* 1933 No. 2 pp 148-152

A third memoir published on this subject in *verbis* the author in 1934 Vol 31 p 101 1935 Vol 32 is a report of an investigation of the administration of the venoms of *Crotalus cerastes* and *Naja tripudians* intramuscularly subcutaneously and intraspinally into dogs. In all, 24 animals were the subjects of experiment. The venom of *C. cerastes* 7 with that of *N. tripudians* and 3 with *Lachesis*. The blood samples were taken by cardiac puncture 1-12 minutes prior to injection of the venom (b) from 1-12 minutes after injection (c) at the time of stoppage of respiration or soon the action of the venom. If the interval between these last was prolonged, others were given. Protocols are reproduced giving details which may be summarized as follows.—

With all the venoms, there was a very slight reduction of the alkali reserve during the early stages of intoxication. In the case of *N. tripudians* this was more marked in the case of poisoning by *N. tripudians* but not so great as with *Crotalus* and *Lachesis*. Further when noted in this regard that the *Crotalus* and *N. tripudians* at a time, gradually return to normal respiration. Both, it is true, have a paralytic action on the respiratory muscles. The venom of *Crotalus* and *Lachesis* do this by diminishing in frequency but increase in amplitude. The respiration is almost solely diaphragmatic, the movements slower and cease almost at the same time as the venom, on the contrary has a curarizing effect, paralysing the respiratory muscles and the respiration ceases for 10-15 minutes after respiration has ceased. Other phenomena which

iii. Details of the symptom-giver cells the renal function variation in term of monkeys dying from potassium, potassium and blood phosphorus. Infection of the venom of *E. naja* been studied it will not be possible to by cobra and *V. russelli* the mechanism of the variations in alkali re, i.e. that thouguing by snake venoms. H H S

~~Infective Agents~~ constituents of the ven-

f haemorrhagic sys der Schlangengifte auf die Blutgerinnung [Some degree wch. Venom on Coagulation of the Blood.]—Ztschr. exp. Therap. 1935 Aug 30 Vol. 85 512. [14 refs.]

Agitated the blood N) CHOWDHURY A. SORDELLI divided snake venoms into two venous injection into the cause coagulation and those that prevent it. and to produce a thrombokinase they compensate for this a slight rise due to the thrombokinase they compensate for this after section of the v. of much too low fibrinogen and so hinder coagulation. The the nerves of Bengal a cork was the verification of these results and their ex these varied with the venoms. Venom of the following snakes was used — all doses repeated *Crotalus-Naja* (2 species) *Sepedon Notechis Bungarus* under free action *Vipera* (7 species including *russelli*) *Bitis* then the anticoagulant for *Lachesis* (3 species) *Crotalus* (5 species)

1. *Venomous snakes* first determined whether the venoms favoured or hindered the coagulation of the blood in the former case which of the factors of the dissociation may be affected by the venom thrombokinase, thrombogen and also the fibrinogen. The preparation of these substances (from the poisoning. The for guineapig and plasma of the sheep) is described. The physiographic traces were made according to the method given by HIRSCHFELD

(Ztschr. f. Immunitätsf u Experim. Therap. 1914 Band 11). The results obtained by Link are given rather briefly with the author summarizes them as follows —

2. *venoms ophidiques* whose venom contains no coagulating constituent.

3. *alkaline* (*Crassus*) which destroy thrombokinase

4. *tritubans N flava Sepedon haemachales* h a proteolytic action.

5. published on this subject *Crotalus Bitis erielans Crotalus ruber C atra C molitor* p 101 1933 Vol. 28 (the last two have also a destructive action on the investigation of thrombogen)

of the venoms of *Crotalus* tempt a proteolytic action

6. intramuscularly subcutaneously *Daboia* ($\rightarrow V. russelli$) *Bungarus fasciatus* into dogs *Crotalus terrificus*

7. the subjects of experiment those venom contains a thrombin-like coagulating with that of *V. trivittata*, and 3,

8. were taken by cardiac puncture proteolytic action.

9. of the venom (H) from 1-12 *berus* (and three other species of *Vipera*) *Lachesis* no of stoppage of respiration or species)

between these last was prolonged, off a proteolytic action.

10. Protocols are reproduced *Scutellatus Crotalus adamanteus*. H J Walton summarized as follows —

The Haemostatic Uses of Snake Venom.—Proc. Roy. Soc. Med. pp 93-96) The case of poisoning by *Crotalus* and *Lei* are given of several patients with severe and previously

it as with *Crotalus* and *Naja* haemorrhage treated successfully with venom of *V. russelli* in a dilution of 1 in 10 000 used on gauze as a plug. Most were

new matter but summarizing present knowledge. The subject is dealt with under the following sections—Recognition of poison snakes and their ready differentiation from non-poisonous; the mechanism of snake bites—the symptoms produced by bites of cobra, krait, *Echis carinata* and *L. russelli*; and finally treatment. The latter is considered under four heads (a) Prevention of passage of the poison into the general circulation (b) local neutralization of the venom (c) specific antiserum giving methods of preparation and dosage (d) treatment of special symptoms and complications. H. H. S.

WERWATH (K.) Verletzungen durch Kreuzotterbisse.—*Med. Klin.* 1938 Dec. 20 Vol. 31 No. 51 (1818) pp 1867-1869

AHILJA (M. L.) Specificity of Antivenomous Serums with Special Reference to Serums prepared with Venoms of Indian and South African Snakes.—*Indian Jl Med Res* 1935 Jan. Vol. 22 No. 1 pp 479-484

The author obtained from South Africa dried venom of the Cape cobra (*Naja flessa*) and concentrated antivenenes, with a view to carrying out the following series of tests—

1. Comparison of the toxicity of Cape cobra venom with that of Indian cobra (*Naja naja*). In this and the other experiments related below pigeons of about 300 gm were utilized and injections were made into the pectoral muscles. Results were recorded 18-20 hours later.

The toxicity was found to be the same or very nearly so—viz., 0.3-4 mgm. being the respective lethal doses.

2. Potency of Cape cobra antivenene against the venom of *Naja naja*. 0.3 cc. protected against 0.8 mgm. of the Indian cobra venom.

3. The reverse of the last, the potency of Indian cobra antivenene against the venom of *Naja naja*. 0.5 cc. protected against 0.8 mgm. of the venom. Clearly the two antisera are to a great degree protective against the other venoms.

4. Potency of these two antivenenes against the venom of the banded krait (*Bungarus fasciatus*). The results were negative neither antivenene protected.

5. Comparison of the haemolytic properties of the Cape and African cobra venom showed them to be practically the same. Further the antivenene of each could inhibit the haemolyzing effect of the other venom.

It follows from the above that these two cobras have the same type of neurotoxin and haemolysin in their venoms and that antivenene prepared in India against *Naja naja* will be equally serviceable as that prepared in South Africa against *N. flessa* and vice versa. [See also GRASSET & ZOUTENDYK above.]

H. H. S.

PEPEU (F.) Ricerche sulla specificità dei sieri antiofidi. [In Specificity of Snake Antivenenes.]—*Atti V Congr. Naz. Normali*, Cagliari 27-31 Maggio 1934 pp. 161-165 [14 refs.]

The author's experiments were carried out on white mice, with the venoms of *Vipera ammodytes*, *Aspis* and *Lebetina*, and the following sera I.S.M. 293 and 132 Pasteur E. R. Pasteur A. N. Venet, *Anticrotalus* and *Antibothrops* both from Butantan. He found the three venoms showed remarkable affinity. The anti-ammodytes and

symptomsliver cells the renal function variation in potassium, potassium and blood phosphorus. If these have been studied it will not be possible to determine mechanism of the variations in alkali snake venoms. H R S

[*Die Drogenwirkung auf die Blutgerinnung*
on Coagulation of the Blood]—*Ztschr Therap* 1935 Aug 30 Vol 85
[24 doses was found; *Therap* 1935 Aug 30 Vol 85
14 refs.]

In investigating the blood PURDELLI divided snake venoms into two groups that favour coagulation and those that prevent it. After intravenous injection to coagulation and those that prevent it was found to produce a true thrombokinase, they compensate for this by a slight rise due to action but, when they are very concentrated by a slight rise due to action but, when they are very concentrated after injection of Hageman's factor or fibrinogen and so hinder coagulation. The results of these experiments verify the verification of these results and their exactness. These varied with the dose repeated with the same species. Venom of the following snakes was used—
Sepedon Notechis Bungarus
Bitis
Crotalus horridus (3 species) *Crotalus* (5 species)

It was determined whether the venoms favoured or hindered coagulation of the blood in the former case which of the substances secreted by the venom thrombokinase, thrombogen or fibrinogen. The preparation of these substances (from guinea pig and plasma of the sheep) is described. The method is made according to the method given by HIRSCHFELD *Ztschr f Immunphys u Experim Therap* 1914 Band 1. The results obtained by Link are given rather briefly with the author summarizes them as follows—

(a) whose venom contains no coagulating constituent.
which destroy thrombokinase.
Taja triplidians N flava Sepedonhaemachates
With a proteolytic action.
Vipera latastei Bitis arietans Crotalus ruber C atra C horridus (the last two have also a destructive action on thrombogen)
Without a proteolytic action.
Mesocoromis Dabora (=V russelli) Bungarus fasciatus
Crotalus terrificus
which whose venom contains a thrombin like coagulating agent.

(b) With a proteolytic action.
Vipera berus (and three other species of *Vipera*) *Lachesis* (three species)
(b) Without a proteolytic action
Notechis scutatus Crotalus adamanteus H J Walton

(Burgess) The Haemostatic Uses of Snake Venom.—*Proc Roy Soc Med* 1935 Sept. Vol. 28 No 11 pp 1460-1472 (93-96)

of several patients with severe and previously age treated successfully with venom of *Vipera* 10,000 used on gauze as a plug. Most were

haemophiles but one was a boy of 4 years suffering from purpura haemorrhagica. When the situation of the bleeding is such that the plug can be applied with pressure the success is immediate, the only danger being recurrence of haemorrhage from disturbance of the clot on removal of the plug this, however is easily controlled by further application of the venom. At times there is difficulty owing to the site of haemorrhage e.g., in a boy of 18 months, a haemophiliac, who was bleeding from a bitten tongue. He lost so much blood that two transfusions were needed. The haemorrhage was finally controlled by a dental plate being fixed over the tongue to maintain the venom-soaked dressing in position. According to the reports on a large number of patients this form of treatment was unsuccessful on two occasions only Of one the author has no details to give (but see CAMBROOK below), the other was found to have a low excretion of ascorbic acid and was probably suffering from subclinical scurvy. The venom has been employed also to stop capillary oozing after breaking down adhesions of the liver after decapsulation of the kidney after tonsillectomy and prostatectomy. In no instance have any toxic symptoms attributable to the venom been observed.

H H S.

CAMBROOK (J. Draper). Snake Venom and its Use in Dental Haemorrhage.—*Proc Roy Soc Med* 1936, Jan. Vol. 29 No. 3, pp. 281-282 (Sect. Odontology pp. 19-20)

Experiment has shown that the venom of *Daboia* (*V. russelli*) in a dilution of 1 in 10,000 will coagulate ten times its volume of haemophilic blood in 20 seconds or less. In dentistry as in some other conditions in which it is locally applied, the liquid should be sterile since it is in contact with a raw surface and this sterilization is accomplished by filtration, since sufficient heat cannot be used without destroying the coagulant property. It is unstable when kept in solution unless in an ice-chest this difficulty was overcome by evaporating the venom with saline under reduced pressure [but see LAVASTINE, HUFF & KOMMISIOS below on the effect of saline on venom], so that when required the proper strength of 10^{-4} was obtained by addition of water.

The author has now employed the venom in more than 50 cases, some of them haemophilic. He prefers block anaesthesia to local because injection must cause some though perhaps only slight damage near the socket. After the extraction, he applies a "squat plug" of cotton wool soaked in hot venom so that pressure is exerted on the edge of the socket, and the plug becomes mushroom-shaped. The patient bites on a gauze roll so that pressure is intermittent this the author finds preferable to an appliance to keep up constant pressure, which may injure the socket and cause extravasation into the tissues. If there has been gross sepsis he allows oozing between application of the plug. He reports two cases of failure one with signs of subclinical scurvy [see BARNETT above], the other was a patient with a tear in the floor of the mouth following extraction by an outside dentist. Bleeding was from the sublingual tissues and stopped spontaneously.

H H S.

BAKER (Geoffrey A.) & GIBSON (Paul C.). A Case of Haemophilia treated with Russell Viper Venom.—*Lancet*, 1936, Feb. 22, p. 428.

A most interesting record. A boy of 11 years, a haemophiliac, came to the Torbay Hospital with a history of 10 days' bleeding from the

gum round an upper incisor. On admission he was pale and collapsed. Blood examination showed bleeding time $3\frac{1}{2}$ minutes coagulation time $7\frac{1}{2}$ minutes. With a mouth wash of acriflavine bleeding stopped, but a few days later recurred and it was found necessary to extract the tooth 3 weeks after the first starting of the bleeding [In the report November appears to be a misprint for October]. Oozing began about 8 hours after and continued in spite of plugging with various substances adrenalin turpentine tannic acid. Blood transfusion was given but the incisions for this (two had to be made the first revealing a vessel too small for the needle) continued to ooze and the boy's condition was becoming very grave. Three days after the transfusion venom of *V. russelli* was obtained and applied locally to the three bleeding sites, in a dilution of 1 in 10 000 on gauze plugs repeatedly during 24 hours. The patient gave no further cause for anxiety firm elastic clots formed and the wounds healed. Some 3 months later bleeding started round another tooth this was extracted and the socket plugged as before with gauze soaked in the venom. Oozing was only slight and ceased completely in 3 days. The author concludes —

Special points of interest are (1) The immediate haemostasis in the tooth socket. (2) The effectiveness at a site where application was not easily sustained the tooth socket was shallow and could not be packed very efficiently (3) The firmness of the clot this was particularly noticeable in the socket where the clot felt to be of the consistency of rubber (4) The complete absence of any undesirable effects although a considerable amount of the venom had to be used.

H H S

LAIGNEL LAVASTINE HUBR (P C) & KORESSIOS (N T) Sur les propriétés coagulantes du venin de vipère Daboia. [Coagulant Properties of the Venom of *V. russelli*]—Bull d Mém Soc Méd Hôp. de Paris. 1935 Nov 25 51st Year 3rd Ser No 29 pp 1529-1533.

The authors record their experiences with some 50 cases in which they employed tampons soaked in the venom to stop surface bleeding. As a diluent they used distilled water as they found the action was reduced when physiological saline was used, while calcium chloride even in minute amount prevented its action. They used a strength of 0.5 mgm in 5 cc. of water (i.e. 1 in 5 000). Haemorrhage from tonsil or mastoid operation was stopped in one minute, whereas a tonsil untreated oozed for half an hour. The method is not applicable to large haemorrhages, such as arterial bleeding. No toxic effects either immediate or remote were seen in any of their patients even when several tampons had to be applied.

H H S

ROSENFIELD (Samuel) & LENKE (Sidney Edward) Tiger-Snake Venom in the Treatment of Accessible Hemorrhage.—Amer Jl. Med Sci 1935 Dec Vol 190 No. 6 pp 779-791 With 1 fig. & 1 graph. [11 refs.]

For the investigation recorded in this article the authors selected the venom of the Australian tiger snake (*Notechis scutatus*) for three reasons (1) It quickly produces a firm clot of blood *in vitro* (2) It hastens clot retraction (3) It does not require preliminary collaborating factors—calcium, thromboplastin, prothrombin. They give a list of six snakes whose venoms are known to be potent coagulants. In the

order there stated the venom of *V. russelli* which is used in England, is the weakest. *Notechis scutatus* (Tiger-snake, Australia) *Pseudochis porphyriacus* (Black snake Australia) *Echis carinatus* (Phormia, India), *Leichesis neuwiedi* (Uruta Brazil) *Bothrops strox* (Per-de-lace, America) *V. russelli* (Dabota, India).

The authors carried out a preliminary titration of the coagulant power of the venom and devised a "clotting unit" for standardizing batches of venom. A clotting unit they define as "The clotting power present in the highest dilution of venom which will produce coagulation of freshly citrated plasma within 2 minutes, the plasma being added to the various tubes of diluted venom in the proportion of 4 to 1. Coagulation within a period of 2 minutes was selected because (1) it is the nearest approach to clinical requirements (2) several tubes seem to clot almost simultaneously at about this time (3) the more delayed clots are of poorer consistency. If n represents the number of the last tube in which clotting occurs within 2 minutes, then the number of units per cc. of the unknown solution = $5 \times 2^{n-1}$. Estimated thus 1/5,000 solutions of the various batches of the venom used by the authors proved to contain at least 7 units per cc. The venom solutions were prepared thus —

"The dried venom was pulverized, and 100 mg. lots were weighed out on a quantitative balance. Sterile normal saline solution was added to produce the required dilution, 1/100 volume of 1 per cent. merthiolate solution being included. The resultant saline solutions of venom (1/1,000 and 1/5,000 containing 1/10,000 merthiolate) were stored in the ice box for 2 days and then tested for sterility. Aerobic cultures on blood plates and glucose broth were made. Since anaerobic spore-bearing pathogens have been described in snake venom each solution of venom was cultured anaerobically and also was injected in sublethal dosage (0.1 cc. of 1/5,000 solution) into the hamstring muscles of a guinea pig. No contaminant was found after the routine treatment with merthiolate. Since sterilization by ultrafiltration or heat seriously impaired the clotting power of the venom, they were not employed.

The authors then give details of 8 patients suffering from various haemorrhagic conditions treated with the venom in dilution of 1 to 5,000. The cases include haemophilia (2), purpura secondary to arsenic poisoning, essential thrombo-cytopenic purpura (2), multiple hereditary telangiectasia, carcinoma of pancreas with jaundice, and a patient with a history of prolonged post-operative haemorrhage with, on this occasion, continuous oozing from leech-bites. Though successful in checking the bleeding, the venom did not prevent later recurrence nor did it affect the course of the disease of which the haemorrhage was a symptom.

H H S.

PECK (Samuel M.) & ROSENTHAL (Nathan). Effect of Moccasin Snake Venom (*Agkistrodon piscivorus*) in Hemorrhagic Conditions.—J. Amer. Med. Assoc., 1935, Mar. 30, Vol. 104, No. 13, pp. 1068-1070.

Moccasin (*Agkistrodon piscivorus*) venom was used in a 1/3,000 dilution of physiological saline with 1/10,000 sodium merthiolate as preservative. An initial dose of 0.4 cc. was given, subcutaneously (being less painful than intradermally as formerly given) and increased to 1.0 cc. For children under 10 years the minimum was 0.2 and the maximum 0.6 cc. Injections were usually given twice a week, but in serious cases more often. Most patients developed hypersensitivity at

the fourth or fifth injection (in 10-14 days) and had to be desensitized. Details are given of (1) Five cases of epistaxis and 2 of haemoptysis. In some of these haemorrhage did not recur after the first few injections and in most there was no recurrence for months after cessation of treatment (2) Seven patients with menorrhagia. In some all the usual methods of treatment had failed—curettage, serum calcium transfusions. The bleeding was controlled by the venom injections but there was a likelihood of recurrence after cessation of treatment a recurrence controllable by further injections. (3) Ten cases of purpura of various kinds—the treatment proved unavailing in three. (4) Four cases of multiple hereditary telangiectasias with epistaxis. These were definitely controlled by the venom but the treatment must be maintained indefinitely (5) Thirteen cases of thrombocytopenic purpura. Nine improved four did not. (6) Three cases of haemophilia in these it failed.

The authors state that except in thrombocytopenic purpura the blood picture is unchanged the bleeding time is not affected and that the treatment is of no value in cases of congenital haemophilia.

[See above MACFARLANE and Burgess BARNETT on the value of the venom of *Vipera russelli* in haemophilia.]

H H S

GREENWALD (Harry M.) Dilute Snake Venom for the Control of Bleeding in Thrombocytopenic Purpura.—Amer Jl Dis Children 1935 Feb Vol. 49 No 2 pp 347-352 With 3 charts [11 refs.]

Having noted the good results reported by S. M. PECK from the use of moccasin snake venom (*Atractodon piscivorus*) in cases of thrombocytopenic purpura the author made trial of it in three similar cases of his own. His procedure was to give intradermal injections of a 1 in 3,000 solution of the venom in physiological saline starting with 0.1 cc. and increasing gradually to 0.4 or even 0.6 cc. injecting every other day for the early doses later every 3-4 days, the whole course of treatment extending from 4-20 weeks.

In all three active bleeding stopped after 3 or 4 injections in one the bleeding time was reduced from 50 minutes to 3 minutes after 7 weeks treatment in the second from 20 to 5 minutes in 24 days in the third from 32 to 6 minutes in 10 days and to 4½ minutes in 32 days. The platelet count increased from 10,000 to 175,000 in 15 days and to 220,000 in 80 days in one case from 0 to 220,000 in 26 days in another (but later fell to 170,000) in the third from 75,000 to 125,000 in 47 days.

These results are impressive, but, as the author remarks not too much can be based on so few cases moreover spontaneous remissions occur in this disease.

H H S

PECK (S M.) CRUMMERS (M L.) & EBY (Lowell A.) Coagulating Power of *Bothrops atrox* Venom on Hemophilic Blood.—Proc. Soc. Experim. Biol. & Med. 1935 June. Vol. 32 No 9 pp 1525-1527

The authors refer to the work of MACFARLANE and Burgess BARNETT on the employment of the venom of Russell's viper as a haemostatic. They themselves have worked with that of the Fer-de-Lance (*Bothrops atrox*) easily obtained from Central and South America and tolerating captivity well, so that a supply of the venom is readily available and cheap. They found that when given *intravenously* the m.i.d. for pigeons

new matter but summarizing present knowledge. The subject is dealt with under the following sections—Recognition of poisonous snakes and their ready differentiation from non-poisonous; the mechanism of snake bites—the symptoms produced by bites of cobra, krait, *Echis carinatus* and *V. russelli*; and finally treatment. The last is considered under four heads (a) Prevention of passage of the poison into the general circulation (b) local neutralization of the venom (c) specific antisera, giving methods of preparation and dosage (d) treatment of special symptoms and complications.

H H S.

WERWATE (K.) Verletzungen durch Kreuzotterbiss.—*Med. Klin.* 1935 Dec. 20 Vol. 31 No. 51 (1935) pp 1687-1689

AHUJA (SI L.) Specificity of Antivenomous Sera with Special Reference to Sera prepared with Venoms of Indian and South African Snakes.—*Indian Jl Med Res.* 1935 Jan. Vol. 22 No. 1 pp 479-484

The author obtained from South Africa dried venom of the Cape cobra (*Naja flavescens*) and concentrated antivenenes, with a view to carrying out the following series of tests—

1. Comparison of the toxicity of Cape cobra venom with that of Indian cobra (*Naja naja*). In this and the other experiments related below pigeons of about 300 gm. were utilized, and injections were made into the pectoral muscles. Results were recorded 18-20 hours later.

The toxicity was found to be the same or very nearly so, i.e., 0.3-0.4 mgm. being the respective lethal doses.

2. Potency of Cape cobra antivenene against the venom of *Naja naja*. 0.3 cc. protected against 0.8 mgm. of the Indian cobra venom.

3. The reverse of the last—the potency of Indian cobra antivenene against the venom of *Naja flavescens*. 0.5 cc. protected against 0.8 mgm. of the venom. Clearly the two antisera are to a great degree protective against the other venoms.

4. Potency of these two antivenenes against the venoms of the banded krait (*Bungarus fasciatus*). The results were negative neither antivenene protected.

5. Comparison of the haemolytic properties of the Cape and African cobra venom showed them to be practically the same. Further the antivenene of each could inhibit the haemolyzing effect of the other venom.

It follows from the above that these two cobras have the same type of neurotoxin and haemolysin in their venoms and that antivenene prepared in India against *Naja naja* will be equally serviceable as that prepared in South Africa against *N. flavescens* and vice versa. [See also GRASSET & ZOUTENDRINK above.]

H H S.

PAPKEU (F.) Ricerche sulla specificità dei sieri antioddidi. [The Specificity of Snake Antivenenes.]—*Att. I Congr. Naz. Microbiol. Cagliari 27-31 Maggio 1934* pp. 161-165 [14 refs.]

The author's experiments were carried out on white mice, with the venoms of *Vipera ammodytes*, Aspis and Lebetina, and the following sera: I.S.M. 293 and 132, Pasteur E. R. Pasteur A. N., Vienna, Anticrotalus and Antibothrops both from Butantan. He found the three venoms showed remarkable affinity. The anti-ammodytes and

anti-aspis neutralized completely all three anti bothrops neutralized that of ammodytes and of lebetina but only to a small degree that of aspis. He concludes that the anti-ammodytes serum can be utilized for treatment of poisoning by all the European vipers and by the Asian lebetina.

H H S

MALLICK (S. M. K.) The Applicability of Flocculation Tests for Standardization of Antivenene.—*Indian Jl Med Res* 1935 Oct. Vol 23. No 2. pp 525-529

If the potency of antivenene could be determined by flocculation tests, analogous to that of RAMON in titrating diphtheria antitoxin much time would be saved as well as cost in animals. The author carried out a series of pigeon tests with cobra venom and horse antisera but unfortunately found that the method of flocculation is not applicable to antivenenes. Five out of 11 horses immunized did not show flocculation though a wide range of mixtures was tried the other six gave flocculation but not in constant proportions as a group though individual horses did furnish constant results. By the pigeon test, though prolonged immunization gave increase of titre of the antivenene the flocculation was the same with that of low and that of higher titre. The author concludes therefore —

The irregularity of the results of flocculation tests of antivenene, and the absence of any exact relationship of the mixtures employed to the titre ascertained by pigeon tests make the method unsuitable for application in standardization of antivenene

H H S

BOULNOIS (J) Efficacité du sérum antivenimeux dans le traitement des hémoptysies tuberculeuses. [Cobra Antivenene in the Treatment of Haemoptysis in Pulmonary Tuberculosis]—*Rev Méd et Hyg Trop* 1935 July-Aug Vol 27 No 4 pp 213-214

Two cases are mentioned and they are noted here because the title may lead others to make trial of the method. The reports however are not convincing. The serum was injected intravenously in doses of 10 cc. In both cases, the spitting of blood continued for some time, in one patient for 48 hours to reappear again 3 days later in the other the bleeding ceased in 3 hours but returned 2 hours later. Seeing that haemoptysis often ceases spontaneously these cases are not convincing of the benefit of antivenene.

H H S

DE CARVALHO (Jarbas) Acidentes mortais pela picada de escorpião [Fatal Results from Scorpion Sting.]—*Rev Med Cirurg do Brasil* 1935 Nov Vol 43 No 11 pp 382-367 With 1 fig

One of the most poisonous, if not actually the most poisonous of scorpions is *Tityus serrulatus* of Brazil. It is generally held that scorpion sting though very painful, is not fatal except to young children or the debilitated. Several cases in which the results were fatal have been reported not only in children but also in adults, according to the site of the injury and the quantity of poison inoculated. Notes are

given of 20 such of ages varying from a few months to 48 years, and Dr MACALHAEES recorded that in one year there were 6,688 cases and 237 deaths, or 3.5 per cent. fatality

H H S.

CERVERA (Ernesto) Suero anti-escorpiónico. [Scorpion Antivenom]—*Bol Oficina Sanitaria Panamericana*. 1938. Feb. Vol. 14, No. 2. pp. 142-149 With 3 charts.

The author who is Director of the Institute of Hygiene, Mexico first reviews briefly the history of the preparation of scorpion antivenom, mentioning the work of C. TOWN with the poison of *Buthus occitanus* striatus that done at the Instituto Botanico, São Paulo, on *Tóxina baktensis* at Durango on *Centruroides suffusus* by HOFFMANN and VARGAS on the Nayarit scorpions, *C. sonorensis*, *C. hirsutus* and *C. suffusus*. Records of cases are related from various district returns. In Iguala there have been no deaths among nearly a thousand cases. In nearly all a single dose of 5 cc. for children and 10 cc. for adults sufficed, but one child of 8 years with severe toxic symptoms was given 10 cc. During the 11 years 1924-34 there were in the Municipality of Iguala 136 deaths from scorpion sting; there were two adults, 50 and 58 years, the rest were under 8 years and 11 were less than 3 weeks old. In Colima one death occurred, a child of 11 months who did not receive the serum till moribund. In Tomatlán 27 cases between 2 and 66 years, all recovered. 19 had 5 cc., 6 had 10 cc. and 2 had 20 cc. It was usually given intramuscularly occasionally intravenously and in two severe cases by both routes. In Durango Municipality 275 cases were reported during 1934 but only two were fatal, a child of 7 years who had no serum and one of 9½ months who did not receive it till too late. In the town of Durango de la Peña and Vicente record 1,808 deaths from scorpion sting in 36 years, 1891-1927, an average of 44.6. In the next five years there were another 109 or 22 per annum.

H H S.

SERGENT (Etienne) Action de l'injection sous-cutanée d'eau contre des doses mortelles de venin de serpents.—*C. R. Acad. Sc.* 1935. Feb. 25. Vol. 200. No. 9 pp 788-790.

— De l'emploi possible des injections sous-cutanées d'eau physiologique contre l'envenemement par morsure de vipère ou piqûre de scorpion. [Injections of Physiological Saline in Viper and Scorpion Poisoning].—*Bull. Acad. Méd.* 1935 Mar 19 89th Year. 3rd Ser Vol. 113 No. 11 pp. 363-364.

The first paper and the first part of the second paper refer to the same experiment.

Dr Sergeant reports that subcutaneous administration of physiological saline in 151 mice was followed by survival of 25 of them (16 per cent.) when the animals were subsequently inoculated in another part of the body with "several" fatal doses of venom of *Crotalus cerastes*. All of 174 controls died and treatment by specific antivenom saved only 59 (39 per cent.) of another 151. He suggests that the saline acts by diluting the toxin before it has time to produce its usual effects. He has obtained similar results using the venom of *Buthus occitanus*, and adds that where the specific serum is not obtainable, the method of subcutaneous saline injection in large amounts should be tried in treatment. No figures are given as to the size of dose employed in the experiments, nor any protocols. Also in the experiments,

the saline was injected prior to the venom. Before recommending its employment as a form of treatment it would be well to test the effect when administered experimentally after the venom]

H H S

BLAIR (A. W.) Spider Poisoning Experimental Study of the Effects of the Bite of the Female *Latrodectus Mactans* in Man.—*Arch. Intern. Med.* 1934 Dec. Vol. 54 No 6 pp 831-843 With 4 figs. [23 refs.]

— Life History of *Latrodectus Mactans*.—*Ibid.* pp 844-850 With 2 figs. (1 coloured)

This spider *Latrodectus mactans* known colloquially as the Black Widow is the only one in the United States of America proved to be poisonous to man. In the second paper which is well illustrated the author gives an account of its appearance habitat feeding habits mating, eggs, development and length of life. In the first he gives a full and very graphic account of the effects of a bite which he allowed to be inflicted upon himself with a view to testing which of the conflicting opinions as to its noxiousness was true. He allowed the spider to bite him on the terminal phalanx of the left little finger and symptoms soon set in

The bite felt like the prick of a sharp needle in 15 minutes the pain, a dull ache, increased and extended to the upper arm the superficial cubital gland was tender (and remained so for a fortnight) and the phalanx of the bitten finger was purple-red, swollen and very painful in 20 minutes there was pain over the whole arm and left side of the chest in 30 minutes praecordial pain. These symptoms are regarded as belonging to the period of lymphatic absorption. During the succeeding 2½-3 hours more serious symptoms prevailed from vascular dissemination. Fifty minutes from the time of biting, drowsiness came on blood pressure was 106 systolic, 78 diastolic in an hour (i.e. ten minutes later) transient epigastric pains, general flushes leucocytes 8400 per cmm. 5 minutes later epigastric pain more marked and in another 10 minutes general malaise pain in neck muscles pulse rate 62. In 1½ hours from the bite severe pain in back, chest and abdomen, speech difficult and jerky respirations rapid and laboured, abdomen rigid pulse 60. In 2 hours pain now in legs also inspiration gasping, expiration laboured and accompanied by a groan in 5 minutes more, inability to stand legs flexed tremor collapse finger swollen tender cyanotic and painful. In 2½ hours from onset, spasm of flexors of forearms and hands tingling in hands and feet, pulse rapid thready uncountable systolic pressure 75. This was followed by slight vertigo and throbbing in the head. Symptoms a little relieved by hot bath in 3 hours pains still more severe, respirations very laboured patient writhing on the bed pulse weak, 120 pressure 80 systolic 50 diastolic. Thereafter recovery was gradual. Vomiting took place 5½ hours from the onset after 8 hours there was still great restlessness and severe pain in abdomen, back and legs pulse rate 78 pressure 154 and 92 leucocytes 18,200 per cmm. polymorphonuclears 82 per cent. no eosinophilia. Urine showed a trace of albumen, many red corpuscles blood and granular casts next day and leucocytes in blood numbered 19,150 per cmm with 77 per cent. polynuclears 18 lymphocytes and 5 large mononuclears. Later the same day the face was flushed and swollen hands tremulous a papular eruption was seen on the bitten finger and the ulnar aspect of the hand diarrhoea. On the second day after the bite 49 hours the patient felt much better the face was less swollen and abdomen less tense but there were pains still in legs and feet, with chills and sweating From then onwards recovery was rapid.

The best treatment would probably be early incision at the site of the bite. This account settles definitely the question of the venomousness of the poison injected by the bite of this spider for the subject was a man 32 years of age, in perfect health at the time. H. H. S.

FINLAYSON (M. H.) "Knoppie-Spider" Bite.—South African Med. Jl. 1936. Jan. 25 Vol. 10. No. 2. pp. 43-45.

"Knoppie Spider" is the colloquial name for at least three species of *Latrodectus* in South Africa, viz. *L. geometricus*, *L. concolor* and *L. indistinctus*. All are common in Cape Province—there may be confusion between the former two but the third is easily identified. *L. geometricus* and *L. concolor* live in out-houses, and in walls and crevices of doors and windows. *L. indistinctus* in the cornfields and on the veldt. The average yield of poison after evaporation to the dry state from *L. geometricus* was 1 mgm., from *L. concolor* about 2 mgm., and from *L. indistinctus* 3-4 mgm. The former two are less toxic than the last, the lethal dose of which for mice is 2-4 times that of cobra, but as the spider venom is obtained in a cruder state, it is probable that, if pure, the toxicity would be about equal to that of the Cape cobra. The antivenenes obtained by 4 intravenous injections into rabbits at weekly intervals were tested. 0.1 cc. of *L. geometricus* antiserum neutralized 1.0 mgm. of homologous extract, 0.4 mgm. of *L. concolor*, whereas 0.2 cc. did not always protect mice against 0.1 mgm. of *L. indistinctus*. There was no neutralization of Cape cobra (*N. flavus*) or puff adder (*Bitis arietans*) venom—hence it is useless to treat spider bite with either of these snake antivenenes.

Symptoms following bites by these spiders were cramp-like pain in the chest and abdomen with abdominal rigidity, sweating and salivation—often cyanosis with nausea, vomiting and dyspnoea. In animals there were sweating, restlessness, staring coat, rapid shallow breathing, paralysis, and convulsions preceding death—i.e. neurotoxic symptoms, like those of Cape cobra venom, though, as stated above, the antivenene of the latter is ineffectual in treatment. The best treatment is incision and application locally of potassium permanganate. Since *L. indistinctus* antiserum completely neutralizes the venoms of all three species, this is the best to keep for emergencies. H. H. S.

PLANTILLA (Fidel C.) & MARALAT (Epanio) *Latrodectus aguyangyang*—Preliminary Notes on the Entomological, Clinical and Experimental Studies.—Monthly Bull. Bureau of Health, Manila, 1935. June. Vol. 15 No. 6. pp. 187-197 With 1 coloured plate.

Poisoning from spider-bite is not infrequent in the island of Cebu and probably elsewhere in the Philippines. The same is a *Latrodectus* distinct from *L. mactans* (the Black Widow spider) and closely allied to *L. hasselti*. Its local name is Aguyangyang, hence it is here called *L. aguyangyang*. Its entomological characters are described when full grown the female extends its legs over about 3.5 centimetres. The body is black and red—one very similar perhaps identical, and also poisonous is brown (instead of black) with red markings.

Symptoms following the bite are local pain like a needle-prick, not severe and soon after there is numbness in the legs with pain and

general weakness followed by fullness and pain in the abdomen which becomes distended and rigid respiration is laboured and thirst is great. These symptoms last for 24-48 hours and then subside. Some have headache vomiting and fever and in fatal cases cyanosis. In one fatal case a man of 51 years bitten on the foot, death occurred in two days.

Experimental work was carried out on chickens, parrots, cats, dogs, guineapigs, white rats, monkeys and frogs. In all there were signs of restlessness and respiratory distress with paresis of limbs sometimes convulsions diarrhoea occurred in the monkey vomiting and salivation were marked in the dog the vomitus becoming blood tinged. The frog suffered from paresis and died in 2 hours, cessation of respiration preceding by some time circulatory failure. Further study of the subject is to be made.

H H S

As regards age, of the 131 sixteen were in the first decade, and in succeeding decades 39, 42, 22, 8, 3, 0 and 1. The age of the youngest was 2 years [in the Purulia outbreak (see following abstract) there was no patient under 4 years]. It is a disease of rice-eating people. The main symptoms are *Oedema* which was seen in 125—it was usually of solid type especially in the early stages and tenderness and redness of the affected parts were common. *Diarrhoea* more often noticed in severe epidemic years when more acute cases are admitted to hospital. *Fever* occurred in 94 of the 131 mostly of a low irregularly intermittent type, in others a low remittent. *Cardiac* symptoms with dilated heart, tachycardia, dyspnoea and even orthopnoea as a result. *Arterio-symptoms*, except for pain and tenderness in the limbs, were rare. Knee-jerks were variable, not altered in 89 diminished in 2, lost in 17 increased in 39 unequal in 14. *Cutaneous* flushing, petechial rash and sarcoids [see below]. *Orbital* retinal engorgement, retinal haemorrhage, cupping of the disc, increased tension.

The death rate in this series was 6.8 per cent. Treatment found most efficacious comprised rest in bed with a rice-free diet, and as regards drugs tincture of *Ephedra vulgaris* with calcium lactate. H H S.

CHOPRA (R. N.) & CHAUDHURI (R. N.). A Preliminary Report on an Epidemic Drosphy Outbreak in Purulia.—Indian Med. Gaz. 1935. Sept. Vol. 70 No. 9 pp. 481-485 With 1 fig. [12 refs.] INDIAN MEDICAL GAZETTE. 1935. Sept. Vol. 70 No. 9 pp. 511-512.—Epidemic Drosphy

Outbreaks of epidemic drosphy have occurred at intervals since 1913, namely in that year in 1927, 1930, 1932, 1933 and the worst in 1934. In the last it started in August and soon spread to adjacent villages, more than 2,000 persons being attacked among a population of 25,974. Further enquiry among 114 villages revealed some 5,000 cases. Thirty-five per cent. of the boys and staff of the Manbhum Victoria Institution and 113 of 450 members at the Purulia Railway settlement suffered. In 13 villages near Purulia with a combined population of 8,000 there were 825 cases, or 10 per cent. incidence.

Very few of the patients were of the poorer classes, nearly all were of the upper and middle classes. The poor labouring class lived only on freshly-husked rice—servants of this class were affected only when they had meals at their masters' houses. In some cases all of a family were attacked, 8 out of 8 in another 9 out of 11 in 20 families with 121 members 74 were attacked. Although on the same diet, the members affected might show very varying grades of severity. Rice was the staple food, parboiled and mostly husked at home. The better classes would throw away the rice-water—the poorer took it with the rice. Mustard oil was also used.

For better study of the disease a Field Unit was established at Gaurangdih, near Indrabil railway station. The sexes were equally attacked, but no child under 4 years (they consume little rice). Diarrhoea was a common symptom, at times very severe, almost choleric. Palpitation and dyspnoea were present—the oedema appeared first in the legs, over the lower third of the tibiae rarely involving the thighs and hands, and never the trunk or face. In 14 patients a macular or erythematous rash was observed on the inner aspect of the thighs [see below]. Abortion always occurred when pregnant women were attacked. The most successful treatment was a rice-free diet, rest,

and administration of tincture of ephedra, 20-30 minims with calcium lactate 10 grains b or t.d.

In an appendix to this paper is a brief account of an outbreak in an engineering camp of Hindus and Mohammedans at Purulia. Forty six of 55 Hindus were attacked, but none of 7 Mohammedans. They mixed freely with each other and used a common water supply in fact the only difference was that the food was supplied by different contractors and the rice of the Hindus was heavily infected with bacteria of the *vulgaris* group that of the Mohammedans being free.

H H S

CHOPRA (R. N.) CHAUDHURI (R. N.) PANJA (D.) Cutaneous Manifestations of Epidemic Dropsy Part I A Clinical Study [CHOPRA & CHAUDHURI] — Indian Med Gaz. 1935 Sept. Vol. 70 No. 9 493-496 With 4 coloured plates. Part II. A Histopathological Study [CHOPRA CHAUDHURI & PANJA] — Ibid pp. 496-498. With 11 figs. on 2 plates.

A study of the cutaneous manifestations of this disease first from the clinical and second from the pathological aspect. The authors describe in detail four cases met with in the last four months of 1934 in whom different types of cutaneous symptoms were observed. In the first there were vascular nodules, 51 in all, some sessile a few pedunculated scattered over the trunk and limbs in the second was a generalized erythema but no sarcoids in the third small red nodules in various parts of the body mottling of thighs and legs and 7 sarcoid growths in the fourth a rash on the legs and increased pigmentation of the face. In their summary the authors state that the pigmentation is a new feature calling for further investigation.

As regards treatment, none is needed for the rash and the pigmentation they clear up as the patient recovers. The sarcoids bleed readily and though the haemorrhage is checked by pressure it is liable to recur. If small, CO₂ snow stops the oozing and brings about their drying up if large they are better removed under novocaine.

In the second paper the histological appearances are described, first of the simple erythema and oedema next of the sarcoid in an early stage, and then in order of the nodular the fungating or ulcerative types and of the healing sarcoid. For details the original must be consulted.

The first part is illustrated with coloured plates showing well the various skin manifestations the second with photomicrographs.

H H S

Dr (Manindra Nath) & CHATTERJEE (Krishnadhan) Nodular Eruptions in Epidemic Dropsy — Calcutta Med Jl 1935 Apr Vol. 29 No. 10 pp 521-538. With 16 figs. (7 coloured) on 14 plates.

The nodular eruptions of epidemic dropsy have been described and figured [see e.g. this Bulletin Vol. 25 p. 437 Vol. 28 pp. 462-3.]

Here are vivid presentations of them on plain and coloured plates, and a description of 9 cases. In the recent epidemic in Bengal the development of superficial cutaneous nodular eruptions has been the dominating feature nodules on mucous membrane have also been

noted. They do not inconvenience the patient but may bleed uncontrollably. Photomicrographs show the presence of a large number of capillary blood vessels in loose areolar tissue. There is no inflammation.

A G Bayliss.

[It might be interesting to examine for Bartonella. There seem to be some points of resemblance between the above and Verruga.—Ed.]

DR (M. N.) & CHATTERJEE (K. D.) Pathology of Epidemic Dropsy—
Indian Med. Gaz. 1935. Sept. Vol. 70. No. 8 pp. 489-601
With 6 figs. (3 on 1 plate)

In this account of the morbid anatomy and histology of the lesions found in patients dying of epidemic dropsy particular attention is given to the cutaneous lesions. The erythema referred to in the preceding abstract is due to vascular dilatation and may occur elsewhere than in the lower limbs. Ecchymotic patches may be seen and consist not of haemorrhage but of tetanglectases. Nodular excrencences are found, developing 3-6 weeks after the first symptoms. They may be numerous, 100 or so, or solitary usually about a dozen and do not appear to bear any relation to the severity of the attack. They may be sessile or pedunculated, of a size from a pea to a lemon, usually quite small. They bleed readily. They arise in the superficial layer of the cutis vera in the skin papillae and contain dilated vascular spaces. They may occur anywhere on the skin and also on the mucosa of the mouth, tongue, nose.

Other lesions to be noted are dilatation of the heart with thickening of the muscle walls and separation of the fibres by dilated capillaries. A distressing complication occurring in 10-12 per cent. of patients was a glaucoma developing some weeks after the primary manifestations. No abnormality could be recognized in the spinal cord or peripheral nerves, though the cord membranes might show marked vacuity. Fatal cases are not numerous and there is need for further study of the pathology of this condition.

H H S.

CHATTERJEE (Hemendra Nath) & HALDER (Montindra Nath). Haematological Studies in Epidemic Dropsy—*Calcutta Med. J.* 1935.
July Vol. 30 No. 1 pp. 1-15 With 4 plates (3 coloured).
[25 refs.]

The authors carried out these haematological studies on 45 cases of epidemic dropsy during the outbreak of 1934. They determined the total red and white cell counts, the haemoglobin, the differential leucocyte count, the reticulocyte count and the presence of abnormal cells.

The total erythrocyte count was not much reduced in a mild case the lowest was 3.8 millions and in a severe case 3.0. The leucocyte total is increased in the early stages to 9,000-10,000 later it is about or a little above normal, 7,100-7,900. The haemoglobin in a mild case may fall to 11 gm. per 100 cc. (the normal average being 14.5) and in a severe case to 7.5 gm. According to the severity of the disease the Aneth. count shows a shift to the left. As regards the differential leucocyte count, the lymphocyte percentage is a little raised, the eosinophils considerably at the expense of the neutrophiles, and the eosinophils appear to become greater as the clinical state improves. The reticulocytes are not increased as a rule. So-called toxic cells increase with progress of the disease and diminish with convalescence.

Toxic cells are characterised by vacuolisation of the protoplasm and the appearance of coarse basophil granules in place of the fine neutrophilic ones in the polymorphonuclear cells. The toxic cells are not present in the normal blood their appearance has been regarded as a sign of toxæmia and their continued and sustained increase indicates a very bad prognosis. The toxic cell index has been expressed by the following formula —

$$\frac{\text{Toxic polymorphonuclear cells}}{\text{Total polymorphonuclear cells}} = \text{Toxic cell index.}$$

The result is finally expressed in per cent. relation to the total polymorphonuclear cells.

H H S

DE LANGEN (C D) & DIJHAN (Bahder) Pellagra in Nederlandsch Indie. [Pellagra in the Netherlands Indies.]—Geneesk Tijdschr v Nederl. Indie 1835 Apr 16. Vol. 75 No 8 pp 659-662. With 3 figs. on 1 plate. English summary (3 lines)

The case described is typical the patient a native of Batavia, 35 years of age, emaciated anaemic, with atrophic glossitis mental depression slight oedema of legs and sores on the dorsum of each foot roughening of the hands etc. Blood examination showed red corpuscles 2 156 000 per cmm. Hb 35 percent. C I 0.8 The case is recorded because pellagra is said to be very rare in the Netherlands Indies.

H H S

SPIES (Tom D) The Treatment of Pellagra.—Jl Amer Med Assoc. 1935 Apr 20 Vol 104 No 16 pp 1377-1380

It is shown in the present study that the severely diseased pellagrin can usually be cured of his disease provided he receives sufficient amounts of a potent specific therapeutic agent, adequate rest, food and nursing care. In many instances treatment of the complications and coexisting diseases is essential.

The author has shown that notwithstanding all the patients of a first series were treated in hospital with a highly nutritious diet 54 per cent. of 78 died in the present series of 125 the fatality rate was reduced to 6 per cent. [but it is stated that one third relapsed and each readmission was treated as a separate case] He says that the successful treatment is governed by the rigid application of certain general and specific therapeutic measures which he describes under the heads general principles specific therapeutic agents and treatment of special symptoms.

The general principles of treatment include sufficient rest and bed for those who are severely ill often large doses of sedatives a well-balanced diet of 4 000 calories or more a day supervision of every detail of diet by the physician food lost through vomiting or diarrhoea to be made up good nursing

The specific therapeutic agents are yeast desiccated hog stomach, wheat germ, liver extract. Of yeast must be given 75-100 gm. of the dry powder daily unless there is persistent vomiting or diarrhoea when one of the other agents must be substituted. It is tolerated best at intervals of 3-4 hours in iced milk or iced egg nog

For desiccated hog stomach (ventriculin) the indications are the same as for yeast it has not the same laxative properties 200 gm. is taken daily in the same way Wheat germ is given in amounts

between 250 and 300 gm. daily. Liver extract may be given orally or parenterally. The oral administration of 75 to 100 gm. each day rapidly cures the great majority of patients with pellagra," but in patients with persistent vomiting, intractable diarrhoea, or severe stomatitis it must be injected daily in 3-5 doses of 20 cc. each. Parenteral injection of liver extract and the simultaneous administration of large amounts of specific antipellagrous materials by mouth is the most successful plan.

For the treatment of special symptoms—viz., stomatitis and glossitis, diarrhoea, abdominal pain, involvement of nervous system, anaemia, dermatitis, the paper must be consulted. Stomatitis occurs in 50 per cent. of severe cases and disappears when the diet is adequate. 60 per cent. have diarrhoea, which may need tincture of opium when recovery starts diarrhoea lessens. Two-thirds have persistent vomiting, treated with small amounts of iced fluids. Two-thirds have nervous system involvement or peripheral neuritis or both. Mental symptoms nearly always improve with time though the use of the stomach tube to ensure adequate nourishment, and sedatives may be necessary. Anaemia is best treated in the convalescent period and is cured either by an adequate diet or by iron. The dermatitis heals easily and so cannot be used for prognosis.

To prevent return of the disease the author advises a quart of milk and 6 oz. of lean beef as supplements to the diet, with turnips, tomatoes and green peas. The author was treating 8 patients with delirium tremens and no pellagra at the same time. Both conditions follow chronic alcoholism and the neurologic signs and symptoms are clinically indistinguishable. It seems therefore possible "that the nervous system of the patient with delirium tremens may be involved in a manner somewhat similar to that of the pellagrin who has mental symptoms." Three of 8 pellagrins who died had cirrhotic changes in the liver and the author notes that 95 per cent. of them "imbibed heartily of alcoholic beverages."

A. G. Bagsterill

SHARP (N. A. Dyce). A Note on a Nutritional Disease of Childhood.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1935 Jan. 25. Vol. 29. No. 4. pp. 411-412.

CARMAN (John A.). "A Nutritional Disease of Childhood." [Correspondence].—*Ibid.* Apr. 17. No. 6. pp. 683-686.

STANNUS (R. Y.) [Correspondence].—*East Afr. & Com. Med. J.* 1935 July. Vol. 12. No. 4. pp. 113-114.

These letters concern a disease, or diseases, in small children described by WILLIAMS from the Gold Coast [this Bulletin 1934 Vol. 31 p. 34] and by GILLAY in East Africa [this Bulletin 1935 Vol. 32, p. 71 see also p. 526] and now stated to occur in Uganda.

The chief features seem to be oedema of the extremities, peeling of the skin and irritability—the latter is usually fatal. In East Africa the passage of large pale greasy stools is noted, and depigmentation of the hair. A vitamin deficiency is suggested by some. A. G. Bagsterill.

STANNUS (Hugh S.). "Kwashiorkor" [Correspondence].—*Ibid.* 1935 Nov. 23. pp. 1207-1208.

Dr. Stannus discusses the disease of West Africa designated Kwashiorkor [see *Bulletin of Hygiene* 1936, Vol. 11 p. 311] and recorded by

Dr Cicely WILLIAMS. He takes in turn the main points held as distinguishing this disease from pellagra and demonstrates that they are not valid differences but that the clinical picture of Kwashiorkor is that of pellagra as it affects infants

H H S

RATTNER (Herbert) Burning Tongue.—*Arch Dermat & Syph.* 1935
May Vol. 31 No 5 pp 701-702. [Summary appears also in
Bulletin of Hygiene]

Burning tongue is a symptom not infrequently an early symptom of avitaminoses or diseases associated with diet deficiencies. Among the conditions in which sore or burning tongue is complained of may be mentioned sprue, pellagra, decoqu  in Seychelles A and B avitaminosis in West Africa, "peripheral neuritis" (so-called) in Jamaica. The following account is therefore both interesting and instructive in that the cause is one which may easily be overlooked and in this case actually was overlooked for several years. The patient had consulted many physicians on account of this symptom who not finding any definite cause, came to the conclusion that it was psychoneurotic. The presence of two amalgam fillings and on the other side three gold inlays caused discomfort and a metallic taste and a micro-ammeter indicated that a distinct current was generated by the dissimilar metals. It was owing to this metallic taste that the patient had the amalgam fillings replaced by gold and the relief of the burning which had troubled her so long was prompt. The moral is clear when a patient complains of burning tongue do not omit examination of dentures. H H S

REVIEWS AND NOTICES.

Svensson (Ruth). Studies on Human Intestinal Protozoa especially with Regard to their Demonstrability and the Connection between their Distribution and Hygienic Conditions.—*Acta Med. Scandinavica*. 1935. Supp. 70. pp. x+113. With 13 figs. on 2 plts & 1 graph. [104 refs.]

This monograph is in many respects an amplification of a paper previously published by the author (this Bulletin 1935 Vol. 32, p. 220). It describes with meticulous detail certain surveys carried out chiefly amongst the general population and mental hospital patients in Sweden with a view to determining accurately the incidence of intestinal protozoal infections. Three methods of examination were carefully compared as regards the accuracy of the results obtained. These were the examination of formed stools, the examination of liquid stools following the administration of magnesium sulphate and the application of culture methods to liquid stools. Though the examination of formed stools revealed a few infections not discovered by the other methods, it became clear that the combination of the direct examination and culture of the liquid stools gave practically all the infections noted. The actual methods of carrying out the various procedures employed are fully described and discussed and the findings obtained are carefully analysed and compared. The results arrived at can only be appreciated by reading the whole work but one or two of the more important points can be referred to here. From the purely practical point of view it is clear that the single examination of the liquid stool following a saline purge will reveal the majority of the infections and that it is only by repeating examinations and combining these with cultures, proceedings which are hardly practicable in ordinary work, that all the infections will be discovered. It is noted that a rural population gave a higher incidence of infection with all species of intestinal protozoa than did a group examined in Stockholm, while amongst mental hospital patients there was found a higher incidence than both these groups had given. It was also noted that amongst the patients the incidence increased with the length of residence in hospital, the recent arrivals giving figures no higher than those obtained from the normal population. This finding once again indicates the association of high incidence of intestinal protozoal infections with lack of cleanliness and sanitation. As regards the general population the results obtained are very similar to those which have been given for England and Germany. It is of interest to note that a group examined in Helsingfors gave a higher incidence than did the normal population of Sweden. Of the individual species found the three amoebae, *E. coli*, *E. suis* and *E. histolytica*, gave fairly regularly the highest figures. A notable feature was the unusually high percentage of infections with *Dendrocoelis fragilis* and *Entamoeba histolytica* amongst the mental hospital patients. It was also revealed that infections with *E. coli* and *E. suis* persist longer in an individual than do infections with *E. histolytica*, *Iodamoeba* and *Chilomastix*. Anyone contemplating carrying out similar surveys is advised to read carefully the account of work recorded in this monograph.

C. M. Weyton.

ACADEMY OF SCIENCES OF THE USSR. *Travaux de la Filiale de l'Académie des Sciences de l'URSS au Tadjikistan.* Vol. 5 [Zoology and Parasitology]—480 pp. With numerous illustrations. 1935 Leningrad. [In Russian.]

This volume dedicated to Prof. E. N. Pavlovsky, contains a collection of papers devoted to the parasitic and free-living fauna of Tadjikistan (Middle Asia). Since it is impossible to review all the papers only a brief survey of the contents of those that have a bearing on tropical medicine and parasitology will be given. P. P. PERFILIEV and V. B. POROV (p. 15) contribute an article on the bionomics of the sandflies (*Phlebotomus papatasi* and *P. sordidus*) of Kuljab another paper by P. PERFILIEV deals with The biology systematics and distribution of sandflies of the group *major* (p. 29). The incidence of intestinal protozoa among the native population of Tadjikistan is reviewed by V. G. GNEZNILOV (p. 63). V. P. PETROV (p. 61) writes on the incidence and epidemiology of kala-azar in Tashkent. G. G. SMIROV (p. 85) reviews the data on Haematophagy among parasitic nematodes. L. F. PARADOXOV (p. 119) describes two cases of echinococcosis of the human orbit. G. J. ZMEEV (p. 125) contributes a paper on the epidemiology of helminthic infections in Tadjikistan. V. L. JAKIMOFF [= W. L. YAKIMOFF] V. S. BELAVIN and S. I. NIKOLSKY (p. 151) discuss the question of cattle anaplasmosis in the Soviet Union. They recognize two species *Anaplasma marginale* and *A. rossum* and compare the symptoms with those in the North African cases. A paper by I. G. GALUZO I. A. TSCHETAEV and V. M. BESPALOV (p. 167) deals with the piroplasms (*Piroplasma bigemina*, *Françoisella colchica* and *Theileria annulata*) of the cattle in the Valley of Gissar. In another paper I. G. GALUZO (p. 187) incriminates the tick, *Hyalomma detritum rubrum* in the transmission of cattle theileriosis. I. G. GALUZO and V. M. BESPALOV (p. 199) recommend the transfer of cattle to mountain pastures in summer as a prophylactic measure against piroplasmosis.

M. V. POSPELOVA STROM (p. 205) gives a systematic account of ticks of the genus *Haemaphysalis* (with a German summary).

The remaining papers are devoted to the free living fauna of Tadjikistan.

C. A. HOARE.

ALL UNION INSTITUTE OF EXPERIMENTAL MEDICINE (VIEM). *Parasites, transmetteurs, animaux venimeux.* [Parasites Vectors and Poisonous Animals.] Recueil des travaux dédié au 25-me anniversaire scientifique du Professeur Eugène Pavlovsky (1909–1934) pp. viii+452. With numerous illustrations. 1935 Moscow [Roubles 17.50].

This book is dedicated to Prof. E. Pavlovsky of the Military Medical Academy in Leningrad on the occasion of the twenty fifth anniversary of his scientific career devoted to various branches of parasitology the advancement of which in Russia is largely due to the wide erudition and untiring energy of Prof. Pavlovsky.

The jubilee volume comprises a series of papers on parasites vectors and poisonous animals contributed by Prof. Pavlovsky's admirers, collaborators and pupils both in Russia and in other countries. The papers appearing in Russian are all provided with summaries in some foreign language while those written by foreign authors are in their native language.

Since in a short review it is impossible to do justice to the wide scope of subjects dealt with in this book the following titles of some of the papers bearing on tropical medicine and parasitology are given for bibliographical purposes —

- BROWNE E. "Etude historique concernant l'étiologie de la fièvre d'Asie centrale sporadique de l'Asie." (p. 41)
- ALIMOV A. "Fièvre récurrente de Perse." (p. 54)
- SERGENT, EDM. ET ER., ET PARROT L. "Insectes et maladies en Afrique du Nord." (p. 68)
- KLIMKOWSKA, A. A. ET PERSTILIKW P. P. "Punaises, pucos et tiques comme transporteurs de virus du typhus exanthématisque dans les conditions expérimentales." (p. 71)
- BYRNICKOW W. "Du rôle joué par les pucos dans la conservation et la propagation du virus de la peste." (p. 89)
- EPSTEIN H., SILVERA, I., AND EXKARIAKWAJA, E. "Rat Fleas as Carriers of Experimental Pseudomoccoccosis Infection." (p. 129).
- EPSTEIN H., SILVERA I., AND EXKARIAKWAJA, E. "Bed-bugs as Carriers of Experimental Pseudomoccoccosis Infection." (p. 139).
- OLESKIEW N. AND LEZER P. "Über die Bedeutung der Brusten bei der Verbreitung des Milbenbrandes (Antilurus)." (p. 145)
- PARROT L. "Les éléments de diagnostic spécifique des Diptères du genre Philopotamus (Psychodidae)." (p. 196)
- PETROVSKAIA, P. A. "Faune biologique et écologie des Philopotamus de Turcomanie." (p. 202)
- NATVIG L. R. "Hypoderma lineatum als facultativer Parasit des norwegischen Wildschweins." (p. 273)
- FAUST E. C. "Host-Third Reaction in Schistosomiasis Mammal." (p. 287).
- WARD H. "The Longevity of the Diplylobothrium Leucki." (p. 292)
- MOSCHKOVSKY S. D. "Beobachtungen an der Weibchenperiode in Afrika." (p. 295)
- SAMKOV G. G. "Nutrition of the Anurid Larvae in the Process of Migration." (p. 298)
- SONDAK, V. "Resistance of the Eggs of the Broad Tapeworm and *Echinophis vermicularis* to Chemicals." (p. 307)
- SONDAK, V. "Cockroaches as Carriers and Hosts of Parasitic Worms in Leningrad and Siberia." (p. 316)
- TALYSIN T. "Contribution to the Morphological Characteristics of the Strobilia of *Diplylobothrium sepositum* Chol." (p. 328)
- SRAKOV J. "Helminthiasis among the Northern Nations." (p. 334)
- SRAKOV, J. AND SONDAK, V. "Some new and little-known Trematode Worms belonging to the Families of the Plagiorchidae and Dicrocoelidae." (p. 348)
- HOARE, C. A. "The Development of Trypanosomes in Tset-Tse Flies in Relation to the Peritrophic Membrane." (p. 367).
- DOOKI, V. AND GUNAWANOWIT W. "Zur Frage über die Nahrung und Nahrungspeichelung bei *Balaenoptera edeni*." (p. 377)
- PAVLOVSKY C. N. "Die Wandlungen der Malaria-parasiten im Sot-Anoden." (p. 389)
- EPSTEIN H. "Contribution à l'étude des hémoperistomes de *Pseudomonas mortetii*." (p. 398)
- PATAHLIX, M. "Les venins dans la thérapeutique moderne." (p. 409)
- PAVLOVSKY E. N. AND DUNAJEWSKA, Z. W. "Grundlegende Richtungen der Untersuchung der Helmintentoxine und Angaben über die Wirkung des Extraktes von *Diplylobothrium Leucki* auf das isolierte Ketonbenz." (p. 416).
- PAVLOVSKY, E., STANI A., AND OUSURKOV N. "Experimental Investigation of the Action of the Salts of Gadflies on the Skin." (p. 429)

REUTER (Johannes) *Oriënterend onderzoek naar de oorzaak van het gedrag van Anopheles maculipennis* Meigen bij de voedselkeuze [Study of the Behaviour of *Anopheles maculipennis* as regards Choice of a Food Supply] [Thesis for Doctorate of Science at Leiden University]—118 pp. With 6 figs [98 refs.] Discussion of the Results in English. 1938 Den Haag N V Electrische Drukkerij Luctor et Emergo

It is generally held that the races of *Anopheles maculipennis* differ from one another in their avidity for human blood. The author has endeavoured to subject this view to experimental tests.

A considerable part of the experimental work was carried out with an artificial arm which was a glass tube through which warm water was circulated. It was generally covered with filter paper and introduced into a cage of mosquitoes observations being made on the insects attempts to bite it. Working mainly with *A. maculipennis* var *atroparvus* the author showed that the most important stimulus is provided by the temperature of the artificial arm which is not attractive unless it is at 28°C or a higher figure [the temperature of the cage not being stated]. Provided the temperature is at 28° or above the wet filter paper was more attractive than dry [though we must demur to the statement that they were of the same temperature for evidently the wet filter paper would be the colder unless the air was saturated at the temperature of the artificial arm]. The author found that paper wet with sweat or cotton ruhbed on the surface of a pig was not more attractive than wet paper if the paper were wetted with blood it became more attractive than paper and water.

The author then evolved a large elaborate piece of apparatus which consisted of a cage of mosquitoes in the centre communicating with a large box on either side. He performed a number of experiments such as putting a man to sleep in one box and a pig in the other and counting the mosquitoes both those full of blood and others in the morning. This experiment appeared to show that the choice of the mosquito is determined by such things as temperature and humidity rather than by the species of host. This view is interesting but it should have been subjected to precise proof or disproof by taking adequate measurements of the climatic factors concerned. So far as the reader of the English discussion can discover no adequate steps were taken to measure these factors.

P A Buxton

THE BRITISH FILM INSTITUTE Catalogue of British Medical Films of Technical Interest to Medical Practitioners and Students—48 pp. London 4 Great Russell Street W C 1 [1s] [Review appears also in *Bulletin of Hygiene*]

This Catalogue which has been compiled by the Medical Panel of the British Film Institute supplies a need which has long existed and should do much to encourage the use of cinematography for educational purposes. The International Institute of Educational Cinematography with the assistance of the Health Section of the League of Nations is preparing an encyclopaedia of medical films produced both at home and abroad and this Catalogue constitutes the first step taken in this country towards international collaboration on the subject.

Information has been collected respecting films in existence at medical schools and universities and many owned by other bodies and

individuals have been examined and added to the list. It is realized, however, that a number have still to be included and it is hoped that these will be brought to the notice of the Medical Panel of the British Film Institute as soon as possible. It is intended, with the help of the Colonial Office, to supplement the Catalogue from time to time by incorporating films produced in the Dominions and Dependencies.

The "Catalogue of British Medical Films" is not a guide as to quality or to the value for teaching purposes of each film included, but it is a well-classified list of British films, and information is given in each case with regard to title, date, author, width, silent or sound, length, suitability and the name and address of the owner. It is well arranged, has a very good index of both authors and subjects and should prove most useful to all persons anxious to develop in this country a method of education which deserves far more attention than it has hitherto received.

[Some 200 films are catalogued, the list being confined to British films—a limitation that explains the omission of many medical films of foreign authorship to be seen in Great Britain, such as the familiar films of Malaria and Hookworm Disease issued by the Rockefeller Foundation. The Kodak Co. have also published a catalogue of their Medical Film Library in which titles of 150 films are given, some of them of tropical interest.]

G. S. Parkinson.

BUREAU OF HYGIENE AND TROPICAL DISEASES

TROPICAL DISEASES BULLETIN

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[No. 6

TYPHUS AND ALLIED FEVERS

BOYD (J S K) Fevers of the Typhus Group in India. An Analysis of One Hundred and Ten Cases reported in 1934 -- *Jl Roy Army Med Corps*, 1935 Nov & Dec Vol 65 Nos. 5 & 6 pp 289-305 361-367 [14 refs.]

This important paper is a result of the recent issue to all laboratories in India of standardized emulsions of *Proteus O* antigens.

Since the beginning of the year 1934 detailed records of all cases of fevers of the typhus group have been submitted to Headquarters and have there been analysed.

In 1934 110 cases of fever were reported in all these cases blood culture was negative for bacteria of the enteric group. It is also interesting to record that although careful investigations were made no strains of *Proteus* could be isolated either from the blood or urine of any of these patients. As regards the results of the Weil-Felix reaction a titre of 1/100 or over was taken as positive and of 108 cases fully investigated

43 cases showed preponderance of *XK* agglutinins.

14	<i>X2</i>
51	<i>X19</i>

Tables are given showing the distribution of the cases by Commands and Districts seasonal incidence and results of the Weil-Felix reaction. The cases have been placed in three categories or groups in accordance with the results of the agglutination reactions and the clinical evidence. Thirty five cases in which *XK* agglutinins predominated are grouped together and it is notable that in these cases the reaction for *XK* was clear and definite and there were practically no coagglutinins for *Proteus X2* or *X19*. The majority of these cases occurred in August and September just after the monsoon this was true whether the cases occurred in the Northern, Southern, or Eastern Commands. As regards the clinical features of the cases in this group they were typical of typhus group fevers but the rash was not well marked and was evanescent and indeed not detected at all in many of the cases and in distribution was confined to the trunk only.

Fourteen cases in which *X2* agglutinins predominated were investigated these cases were limited to the Deccan and the Poona district and occurred during November and December. The rash in these cases

was a prominent feature, resembling the rash in boutonneuse fever, and consisted of macules, papules and petechiae. The distribution was general and included the face and palms and soles. Although XK was the predominant agglutinin in this group co-agglutinins for XX and $XI9$ were also present, and the reaction was in the nature of a group reaction rather than a main agglutinin.

The 61 cases in which $XI9$ agglutinins predominated could be divided into 3 groups. (1) 16 cases from Poona which were clinically identical with the $X2$ cases described above. (2) a group of 21 cases from Bangalore which clinically and serologically ($XI9$ main antigen) resembled endemic typhus. (3) 8 other cases scattered about the country some of which resembled the $X2$ type, some the XK , and some neither. In none of these 110 cases was it possible to incriminate any insect vector and the author deprecates the use of the diagnosis "Indian tick typhus" a name he says which has given rise to confusion and so far is without any direct scientific proof to support it.

	XK	$X2$	$XI9$	
			Poona	Bangalore
Geographical Distribution	Northern, Southern & Eastern Commands	Deccan & Poona District only	Deccan District & Poona	Southern Command except Poona
Seasonal Incidence	Maximum Aug & Sept	Maximum Dec.	Maximum Dec.	All year round except Feb & Apr.
Rash— No. of cases*	Br. 15/1 Ind. 1/14	Br. 6/3 Ind. 5/5	Br. 10/10 Ind. 6/5	Br. 3/3 Ind. 1/2
Day of appearance	5th or 6th	3rd-4th 10th	3rd 7th	4th-10th
Type	Flush + macules	Macules, Papules, Petechial	Macules, Papules, Petechial	Macule-papule
Distribution	Trunk only	Generalized	Generalized	4 cases trunk only 2 cases trunk and limbs
Duration of rash	7 days	Br. 16-4 Ind. 14-4	Br. 25 Ind. 10-5	Br. 4 Ind. 3
Staining ~	Nil	Br. + in some cases	Br. + in some cases	
Duration of Pyrexia	14-2 days	12-5 days	15-5 days	10-4 days
Previous agglutinins	$XK+++$ $X2-$ $XI9-$	$XK\pm$ $X2+++$ $XI9\pm$	$XK\pm$ $X2\pm$ $XI9+$ to ++	$XK\pm$ $X2\pm$ $XI9+++$

Numerator = number of rashes, denominator = number of cases

Br. = British. Ind. = Indian.

Summary—(1) A definite *XK* group is described corresponding closely to Malayan scrub typhus (2) It is suggested that there are also 2 other types of typhus in India, one having as its main antigen an unknown strain of *Proteus* and resembling Rocky Mountain fever and the other with *XI9* as its main antigen and resembling endemic typhus.

D Harvey

COVELL (G) Studies on Typhus in the Simla Hills. Part I. Introduction. Part II. The Weil-Felix Reaction in Wild Rats. Part III. A Strain of Typhus recovered from Wild Rats.—*Indian Jl Med Res* 1936. Jan. Vol. 23 No 3 pp 701-708. [67 refs.] 709-712 713-720 With 2 figs. on 1 plate.

I The introduction of this paper consists of an interesting historical account of the typhus group of fevers in general and of typhus fevers in India in particular.

The author emphasizes the fact that there are two distinct types of the typhus group of fevers in Kasauli one type the sera of which agglutinate *Proteus OXK* occurs during and after the rains August September October the other type the sera of which agglutinate *Proteus XI9* occurs in the winter and in the early spring [See this *Bulletin* 1935 Vol 32 p 572.]

II Taking 1/50 as a standard positive reaction for *Proteus XI9* and 1/125 as standard for *Proteus OXK* 22 rats or 4.2 per cent. out of 500 examined gave a positive reaction.

It is interesting to note that if the rate is calculated by areas the ratio of rats giving a positive reaction in areas where cases of typhus had occurred is nearly double the rate in rats captured elsewhere.

III Emulsions were made of the brains of rats and inoculated intraperitoneally into guineapigs and intraocularly into rabbits. It was not possible to isolate a virus by this latter method but in 2 out of 5 rabbits a positive Weil Felix reaction was obtained. In 2 out of 30 guineapigs inoculated fever resulted and in one was accompanied by scrotal reaction. This infection has now been passaged for 10 generations and in each instance has resulted in fever after an incubation period of 4 to 10 days and in the case of male guineapigs accompanied by scrotal reaction in 63 per cent.

Rickettsia could be readily demonstrated in smear preparations made from the tunica of guineapigs and also from white rats.

Thirteen white rats 7 rabbits and 2 monkeys gave positive Weil Felix reactions for *Proteus XI9* and one rabbit gave a positive reaction for *Proteus OXK*. The 3 rats from which this virus was actually isolated gave the following Weil-Felix reactions.

	<i>XI9</i>	<i>OXK</i>
Rat 397	100	45
389	50	250
402	100	70

The virus was therefore probably mixed from the 2 varieties. Although it has not yet been possible to test the immunity of the animals infected with this virus against a known virus of typhus there can be little doubt that a typhus virus has been isolated from rats in India. D H

SHORTT (H. E.) & D'SILVA (H. A. H.). The Distribution of Indian Tick Typhus with Notes on Laboratory Findings.—*Indian Med. Gc.* 1938. Jan. Vol. 71 No. 1 pp. 13-21 With 1 map & 8 charts. [32 refs.]

The author gives a table of 117 cases of the typhus-like fevers which have been recorded in India in recent years, these cases are not confined to any one area but occurred all over the country. The general inference is that these cases occur in the summer in the hills and in winter in the plains [but COVALL has pointed out that in Kasur one type of typhus occurs during and just after the rains, August, September, October and another type occurs in the winter and early spring].

Four cases of typhus fever OXK type vector unknown were investigated by the authors—unfortunately none of the 4 cases came under investigation until in the late stages of the fever. Blood was taken from these patients and inoculated into experimental animals—guinea-pigs, rats and rabbits. 120 animals in all were employed.

It was not possible to isolate a typhus virus from any of the animals, but of 28 guinea-pigs 2 developed fever and 6 out of 8 rats after a definite incubation period. The infection, however, could not be passed on to other animals nor was it possible to test for immunity to a typhus virus. Of 3 rabbits inoculated one showed a rising and falling titre of agglutination for Proteus OXK.

It has been suggested that the grey palm squirrel, a recent arrival in the hills, may be the reservoir of a typhus virus. Sixty-five of these animals were captured locally and their sera tested. 55 per cent. gave a positive reaction of 1/25 or higher for OXK whereas only 20 per cent. of squirrels captured in the plains gave a positive reaction. An examination of these squirrels showed that the hill squirrels were harboring fleas and the plain squirrels lice.

D. H.

O'CONNOR (M. P.). Typhus Fever with Special Reference to its Occurrence in Malaya.—*Malayan Med. Jl.* 1935 June & Sept. Vol. 10, Nos. 2 & 3 pp. 25-33 79-89 With 6 figs. 1 map & 8 charts. [107 refs.]

This able paper is divided into 2 sections—the first dealing with the historical aspect of typhus fevers generally and with typhus fevers in Malaya in particular. There is nothing special to note in this section except that the author emphasizes again the close relationship, as regards epidemiology and serology, between scrub typhus and Japanese River fever. Indeed his conclusion is that Japanese River fever in Malaya is scrub typhus (Are the primary sera [would it not be more correct to say that scrub typhus is Japanese River fever since the primary sera?]). As the author states, most of the publications dealing with these fevers in Malaya have hitherto been concerned with the laboratory side and the clinical side has been neglected. The second section of the present paper contains a very full and detailed clinical description of 86 cases of scrub typhus which came under the care of the author in the General Hospital of Kuala Lumpur Central Malaya. Most of these cases occurred among people who were employed in clearing overgrown rubber plantations or pruning the palms and also among people, mostly Chinese, engaged in working over abandoned surface mines—all are occupations which caused disturbance of rats and their ectoparasites. Twenty-one cases occurred

in 1932, 21 in 1933 and 44 in 1934. Of the 86 cases 33 were Tamils 28 Chinese 19 Indians 1 Malay 5 Europeans but the main factor was occupational. The death rate in this series was 4.7 per cent.

As regards the incubation period this could be definitely determined in one case at least as 13 days but was generally determined as from 10 to 21 days. The onset was usually abrupt and the general fever curve differed from that of true typhus in that there were daily remissions and in some cases actual intermissions of the fever. The duration of the fever varied from 10 to 20 days. The rash appeared on the 5th or 6th day and was difficult to see in natives and as a rule was ill defined, appearing first on the back and chest, in no case did it involve the palms or soles. Headache and sleeplessness were constant symptoms, the pulse was slow in relation to the fever cough was usually present and mild delirium in some cases. Recovery was rapid after the fever ceased.

The differential diagnosis is discussed. Typhoid fever presents difficulties but blood culture should help and there are differences in the rashes also the common appearance of enlarged glands in scrub typhus (62 per cent of this series) is a differential point as is also the increased rate of respiration which was present in all cases of the series.

The Weil-Felix reaction is of course a great help in diagnosis but is not so useful in scrub typhus as it is in true typhus owing to the fact that it does not as a rule appear until the fever has ceased whereas the chief difficulty of diagnosis arises in the early days of the fever.

As regards the Weil-Felix reaction in the present series all but 2 gave a positive reaction with Proteus XA.

38 cases were positive in 1/200 to 1/500			
21	1/500	1/1 000	
18		1/1 000 and over	

One case gave a positive reaction up to a dilution of 1/28 000.

The maximum titre was obtained as a rule on the 17th day of the illness. Certain typical cases are selected and full notes are given with temperature charts etc.

Prophylaxis lies in vaccination of those exposed and intensive destruction of rats. Treatment is purely symptomatic.

[The reviewer is pleased to note that on pp. 25 and 38 of the *Malayan Medical Journal* of June 1935 several sentences from the critical review published in the *Bulletin* (1933 Vol. 30 p. 343) are quoted but regrets that no mention is made of this review in the otherwise ample bibliography at the end of the article.]

D H

WOLFF (J. W.) & KOUWENAAR (W.). Onderzoeken over Sumatraansche Rickettsiosen. [On Rickettsia Diseases in Sumatra.—Genootsch. Tijdschr. v. Nederl. Indie 1936 Feb 4 Vol. 76 No. 5 pp. 272-288. With 5 graphs. (20 reis.) English summary]

An epidemiological survey of the occurrence of Sumatran mite fever (textingamushi disease) scrub typhus and shop typhus (endemic typhus) on the East Coast of Sumatra. From 1930 to 1934 the first two diseases occurred frequently among the labour population of different plantations in areas where uncultivated strips of land had to be cleaned. In these areas cases of mite fever and scrub typhus were

SHORTT (H. E.) & D'SILVA (H. A. H.) The Distribution of Indian Tick Typhus with Notes on Laboratory Findings.—*Indian Med. Gc.* 1936. Jan. Vol. 71 No. 1 pp. 13-21 With 3 map & 5 charts [32 refs.]

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It was not possible to isolate a typhus virus from any of the animals, but of 28 guinea-pigs 2 developed fever and 6 out of 8 rats after a definite incubation period, the infection, however could not be passed on to other animals nor was it possible to test for immunity to a typhus virus. Of 3 rabbits inoculated one showed a rising and falling titred agglutination for Proteus OXK.

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LEWIS (Seaborn J) *Endemic Typhus Fever in South-east Texas*.—
Southern Med Jl 1935 Dec. Vol. 28. No 12 pp 1150-1153 [16 refs.]

The first case of endemic typhus was recorded in New Orleans in 1929 and since then many more cases have been diagnosed, 40 in 1933. The Weil-Felix reaction which is a routine in the Hospital was positive for *Proteus X19* in all cases.

The author emphasizes the point that the skin manifestations in the cases that came under his observation have been with few exceptions insignificant and easily overlooked. In many no rash was ever detected by the physician in charge. As the author states this point has not been sufficiently stressed in the literature and many cases of endemic typhus have been missed, as the physician has been taught to expect a profuse general typhus rash.

For prevention the author urges intensive rat campaigns such campaigns in Texas have been followed by a marked drop in the number of the cases.

D H

PERCHER (J) & CASTIER (J) *Le typhus exanthémique au Ruanda Urundi* [Typhus Fever in the Belgian Congo].—*Ann. Soc. Belge de Med Trop* 1935 Sept. 30 Vol. 15 No 3 pp 305-347 With 9 figs. & 1 map

Towards the end of 1933 there was a sudden outbreak of a febrile disease in the district of Urundi, Belgian Congo which was at first diagnosed as "infectious influenza". As the number of cases increased and many were fatal a fuller investigation was made and it was found that the disease was true epidemic louse-borne typhus. That the cases were true typhus was proved by the fact that the Weil Felix reaction was positive in high titre with *Proteus X19* also lice taken from patients and emulsified and injected into guineapigs produced a typical fever in these animals without any scrotal reaction. Clean lice fed on cases of fever were proved to be infective after a suitable incubation period. There were several thousand cases and the mortality rate at one period was 16.4 per cent.

As soon as it was realized that typhus fever existed isolation hospitals were established on suitable sites and all cases of fever were at once brought to these places on arrival all clothing was removed and disinfected, the patients were bathed and shaved and clothed in hospital garments. Contacts also were segregated and dealt with in a similar manner at the same time rigid quarantine was set up around the infected areas and the inhabitants were prevented from travelling out of such areas. Under this system the epidemic receded rapidly and within a short time no further cases were reported.

The authors are of opinion that the disease is not endemic in the Congo and that infection was introduced from without possibly from Uganda.

D H

GROUD (P) *Enquête sur les rats des foyers typhiques du bled et d'une antique cité de l'intérieur de la Tunisie où le typhus sévit*. [Examination of the Rats of Typhus Centres of the Country and an Ancient Town in the Interior of Tunis].—*Bull. Soc. Path. Exot* 1935 Dec. 11 Vol. 28. No 10 pp 897-899

Louse-borne typhus was prevalent in the town and country at the time of this investigation. Two-hundred and thirty four rats were

captured and examined but it was not possible to isolate a typhus virus from any one of these, in marked contrast to the city of Tumba, where a murine typhus virus can be readily obtained from the rats near the docks and quays. The conclusion is that where louse-borne typhus is concerned man is the reservoir of the virus and not the rat. [See the *Bulletin* 1935 Vol. 32, p. 558.]

D H.

NICC (Clara) On the Presence of Typhus Virus in Wild Rats in New York City.—*Jl Infect. Dis.* 1935. Nov-Dec. Vol. 57 No. 9 pp. 252-254 [27 refs.]

Fifty-one wild rats were captured in the Metropolitan area of the city of New York, most of them from the neighbourhood of the wharves. The sera of 16 of these rats gave weak positive Weil-Felix reactions. The brains of these 16 rats were emulsified and injected into guinea-pigs, 2 for each rat brain. None of the 32 guinea-pigs showed any fever and no virus could be isolated, but 5 of the guinea-pigs when tested later, showed some degree of immunity to a known typhus virus. D H.

DA FOSECA (Flavio) Notas de acarologia. I. Ocorrência, em São Paulo de acaríacos transmissores de várias modalidades de febre exantemática e suas possíveis relações com a Rickettsia neotropical paulista. [Species of Ticks and Mites which may be Transmitters of the S. Paulo Typhus Virus.]—*Mém. Inst. Butantan* 1935 Vol. 9 pp. 27-41 [28 refs.] English summary

The following have been found in the districts where S. Paulo typhus is endemic *Amblyomma cajennense*, *A. ovalis*, *A. strobli*, *R. sanguineus*, *B. microplus* and *H. leporis palustris* among the Ixodidae; *Liponyssus bacoti* and other species and several of the Trombiculidae.

On both epidemiological and experimental grounds transmission by a tick was most probable, especially *A. cajennense*, since it is readily infectible and attacks rodents and human beings. The other two species of *Amblyomma* mentioned are common on dogs in the rural districts of S. Paulo while *R. sanguineus* is under suspicion since it can transmit endemic typhus elsewhere as on the Mediterranean Ixodidae—*Ixodes holocyaneus*. *H. leporis-palustris* is commonly found on feral and can carry Rocky Mountain fever virus. Epidemiologically there is evidence that the mites may transmit infection but this needs further investigation.

H H S

LEWTHWAITE (R.) & SAVOOR (S. R.) The Typhus Group of Diseases in Malaya.—Part I The Study of the Virus of Rural Typhus in Laboratory Animals. Part II The Study of the Virus of Tick-borne Disease in Laboratory Animals. Part III The Study of the Virus of the Urban Typhus in Laboratory Animals.—*Brit. Jl Experim. Path.* 1936. Feb. Vol. 17 No. 1 pp. 1-22 With 6 charts & 14 figs. (4 coloured) on 3 plates. [19 refs.] pp. 23-34 With 2 charts & 7 figs. (3 coloured) on 2 plates. [10 refs.]

I The authors refer to the difficulty experienced in establishing a strain of the virus of rural typhus (scrub typhus) in guinea-pigs. Previous workers have found that the intraperitoneal injection of blood taken from cases of the disease has occasionally produced fever in guinea-pigs but it has not been possible to passage the virus in series. The authors using guinea-pigs fed on a diet deficient in vitamins

succeeded in two instances in infecting guineapigs and after considerable difficulty in the first few passages established the virus and it is now in its 100th generation. Guineapigs can now be easily infected either by the intraperitoneal or subcutaneous route special precautions as regards the diet of the animals is no longer necessary. The infection in the guineapig produces a fever of variable duration but in none of the infected male guineapigs was any scrotal reaction noted. Enlargement of the spleen and ascites were constant post mortem features and in the fibrinous exudate on the spleen typical Rickettsia were readily demonstrated and are beautifully shown in the plates, which should be studied. When the virus was fully established in guineapigs a mortality of 90 per cent. occurred in the infected animals. [In Japan it has been found that the virus of tsutsugamushi fever produces only a mild illness in guineapigs whereas the virus of Sumatran mite fever produces a severe and often fatal infection.] The lesions in the guineapig brain were meagre but typhus nodes could be found after careful search also mononuclear perivascular collections were noted in the mesentery of the guineapig. Inoculation (intraperitoneal) of the virus into rabbits produced no symptoms of illness but a positive Weil-Felix reaction for *Proteus OXK* was detected. The route of choice for inoculation of rabbits is the intraocular according to the technique employed by Nagayo in Japan. Blood from 12 patients was inoculated into the eyes of rabbits and no less than 4 strains of virus were obtained by this means. Infection was also readily obtained by the same route when emulsion of the brain of infected guineapigs was utilized. The local reaction in the rabbit's eye was similar to that described by Japanese workers with the virus of tsutsugamushi fever that is an iridocyclitis. The rabbits did not have any fever and there were no general effects after recovery from the local lesion. Immunity to the virus followed and persisted for at least one month. Rickettsia were demonstrated in the cells of Descemet's membrane and were similar to those seen in smears from the spleen of infected guineapigs and also to those described in the eye of rabbits infected with the virus of tsutsugamushi disease in Japan.

As regards the Weil Felix reaction in infected rabbits the results were as follows 29 rabbits infected by the intraperitoneal route 18 positive for *Proteus OXK* all negative for *Proteus OX19* 26 rabbits (intraocular) 12 positive for *Proteus OXK* with a rising and falling titre, all negative for *Proteus OX19*.

Six rabbits were inoculated intradermally with emulsion of brain of infected guineapigs a macular reaction occurred at the sites of injection in all and in four instances a definite small necrotic ulcer developed (tache noire).

Rats—It has been found that wild rats as experimental animals in rural typhus research have been unsatisfactory for several reasons but the authors have discovered that white rats can be readily infected with the virus which they have isolated and this virus can be indefinitely passed in these animals (evidence that the virus is a murine variety and that the rat is a reservoir). The infected white rats had little or no fever and showed no scrotal reaction infection had to be determined by employing guineapigs as indicators also rabbits inoculated from infected white rats developed agglutinins for *Proteus OXK* and Rickettsia could be demonstrated but sparsely in smears from the tunica vaginalis of these white rats. Incidentally no scrotal swelling was noted in any of the guineapigs infected from the white rats.

Monkeys.—Four monkeys injected intradermally with the rural typhus virus developed fever and a local reaction—a small ulcer with necrotic centre at the site of inoculation. In 3 out of the 4 a bubo was also detected. All monkeys showed a leucopenia and the Weil-Felix reaction was positive for *Proteus OXK* in all 4 but the serum of one gibbon also agglutinated *Proteus OX19*. This gibbon strain of virus was subinoculated into rabbits and the sera of these animals soon lost the agglutinin for *Proteus OX19* and later only agglutinated *Proteus OXK*.

II. A strain of the local Malayan virus of tsutsugamushi fever obtained from a case of the disease was also studied. Tsutsugamushi fever in Malaya differs from rural typhus only in that a primary sore occurs in the former disease. This virus has not yet been established in guineapigs although these animals have been infected by the intra-peritoneal route and the post mortem findings are identical with those in animals infected with the rural typhus virus described above. The tsutsugamushi virus can be readily inoculated into the eye of a rabbit and produces exactly the same effects as does the rural typhus virus, and identical Rickettsia can be demonstrated in the cells of Descemet's membrane—the sera of these infected rabbits agglutinated *Proteus OXK* and not *Proteus OX19*.

Intradermal inoculation of this tsutsugamushi virus in monkeys and rabbits produces the typical primary sore and in monkeys a leucopenia was noted and agglutinins for *Proteus OXK* were produced.

III. Guineapigs can be easily infected with the virus of urban typhus and it can be readily passed in these animals. Fever is invariably produced and 95 of the infected male guineapigs showed a very marked scrotal reaction which disappeared as the fever ceased. The mortality in the guineapigs with this virus was less than 1 per cent. The virus of urban typhus does not protect guineapigs against the virus of scrub typhus or tsutsugamushi fever nor vice versa. On post-mortem examination of infected guineapigs enlarged spleen was noted and marked changes in the tunica vaginalis (fully described in the text) but there was no ascites in contrast to the condition noted in guinea-pigs infected with rural typhus virus.

Rickettsia were readily found in smears from the tunica. The Rickettsia found in urban typhus resemble those found in rural typhus in that they infect the same type of cell, their intracellular distribution is the same and the staining by Giemsa method is alike, but they differ from one another in length, width and numbers. In rural typhus the form is coccoid and diplococcoid and resembles *R. ornithodori* in this; in urban typhus the form is rod-like, they are fine delicate bacilli and resemble *R. prowazekii*. Intraocular injection of the virus of urban typhus produced a reaction in the eyes of rabbits but much less marked than that produced by the virus of rural typhus and it was not possible to pass the virus beyond the 3rd generation.

Fifty-eight rabbits were inoculated with the virus and of those 30 gave a positive Weil-Felix reaction for *Proteus OX19* and a negative reaction for *Proteus OXK*.

Both rabbits and monkeys were injected intradermally with the virus but in none did a local sore develop at the site of injection, the serum of infected monkeys agglutinated *Proteus OX19* and there was no leucopenia in their blood, in marked contrast to the effects of injection of the viruses of rural typhus and tsutsugamushi fever.

D H

KLIGLER (I. J.) ASCHNER (M.) & LEVINE (Sonia) Comparative Studies of the Louse-borne (Epidemic) and Flea-borne (Murine) Typhus Viruses.—*Brit Jl Experim Path* 1936 Feb Vol. 17 No 1 pp 53-60 [11 refs.]

The authors give an historical review of work done on the various typhus viruses and point out the striking differences in pathogenicity of the louse borne and flea borne viruses for guineapigs and rats. The flea borne virus can be readily passaged in rats and mice and after 30 brain passages the properties of this virus remain constant notably the production of a scrotal reaction in guineapigs.

The louse-borne virus cannot be passaged in rats or mice and rarely if ever produces scrotal reaction in guineapigs. The authors studied the question first by infecting animals with the two viruses and later testing for immunity.

Fifty-seven animals were infected with the flea-borne rat virus and 17 were infected with the louse-borne or human virus when tested later the animals were found to be immune both to the homologous and heterologous virus. But when formalized vaccines prepared from tissue cultures were employed for immunization a striking difference from the above results was noted solid immunity was produced to the homologous virus but only partial immunity to the heterologous.

The authors consider that the two viruses differ both antigenically and biologically and they agree with NICOLLE that though probably having a common origin the two types are at present distinct. D H

LAIGRET (J) & DURAND (R.) Technique de la dessication et de l'endrage du virus typhique murin. [Mode of drying and coating the Virus of Murine Typhus].—*Arch Inst Pasteur de Tunis* 1936 Jan. Vol. 25 No 1 pp. 82-83.

The brain of an infected rat or guineapig is made into a paste with phosphate of soda and dried over chloride of calcium *in vacuo* the drying is completed in 8 hours and the dried brain is then pulverized. Various tests were made and it was found that the murine typhus virus stands desiccation well and the virulence is not altered in any way. The yolk of egg is added drop by drop to the pulverized brain 4 cc. of yolk to 1 gram of powder and then dried again retained at a temperature of -10°C thus virus is active up to 15 days and *in vacuo* up to 12 days. The virus was also enveloped in oil only and was active up to 15 days. In actual practice the powdered virus in yolk of egg is taken to the place where the inoculations are to be carried out and the oil is added on the spot.

D H

REGENDANZ (P) & MUNIZ (Julio) Pesquisas sobre a transmissão do typho exantematico de S Paulo por ixodídeos. [Transmission of the Virus of S. Paulo Typhus by Ticks].—*Brasil-Médico* 1936 Jan 18. Vol. 50 No 3 pp 45-48.

Guineapigs were the animals used in this investigation to determine the transmissibility of S Paulo virus by *Rhipicephalus sanguineus*. It is shown that nymphs developing from larvae which had fed on infected animals are themselves infective and can transmit the virus to other animals and further that these ticks, infected in the larval stage retain the infection as adults. In other words infection is retained and transmissible through all the stages of the tick's life, and it remains to be

proved whether the virus can pass to the ovum and so to a new generation. It is true that ticks are not often found on typhus patients, but, as the authors state, the larvae engorge themselves in 2-3 days and the nymphs in 1-2 days their bite is so slight that it may pass unnoticed and they drop off when engorged, and hence are not present by the time symptoms appear

H H S.

MONTEIRO (J. Lemos) Tentativas de transmissão experimental do "typho exantematico" de S. Paulo por percevejos (*Cimex lectularius*) [Attempts to transmit the S. Paulo Virus by Bed Bug]—*Mem. Inst. Butantan*. 1935. Vol. 9 pp. 1-24 With 16 graphs. English summary

Series of experiments were carried out (1) with adult *Cimex lectularius* collected in a house in Pinheiros (2) with laboratory reared larvae (3) with laboratory reared adults. As a result it was found that the virus is soon reduced and lost in the bed-bug. If the insect was fed on an infected guinea-pig during the febrile stage it was infective for a few not more than 24 hours. Further tests carried out at intervals from 2-25 days were all negative by bite or by faecal inoculation.

H H S.

MORIZ (Julio) & REGENDARZ (P.) Cultivo do vírus do typho exantematico em S. Paulo. [Cultivation of the Virus of S. Paulo Typhus.]—*Brasil-Médico* 1936. Jan. 11 Vol. 50 No. 2 pp. 23-24 With 1 fig

The technique employed was that of Li and Rivers for cultivating vaccinia virus. This consisted in obtaining chicken embryos, 6-7 days old, washing in Ringer's solution and placing in a Petri dish with 1 cc. of Tyrode's solution of pH 7.7. After dividing the tissue as finely as possible 0.1-0.2 cc. of the emulsion was placed in Erlenmeyer flasks each containing 5 cc. of Tyrode's solution and the material for seeding was the triturated spleen (in Tyrode solution) of a guinea-pig killed on the second day of fever after infection with the virus. Cultivation was carried on for 5 days at 37°C. after which 1-2 cc. were injected intraperitoneally in guinea-pigs, test being made of the same culture for bacterial sterility. The animals presented the characteristic course of temperature and died on the 8th or 9th day after inoculation. Rickettsia were found in scrapings from the peritoneum in about half the animals (a higher percentage than is found by direct inoculation of infected blood). Rickettsia were not found on examination of the cultures themselves—smears of the fluid medium or of the embryo tissue.

H H S.

DA CUNHA (A. M.) Cultura da "Rickettsia" do typho exantematico de S. Paulo na membrana chorio-allantoica do embrião de galinha. [Cultivation of Rickettsia of S. Paulo Typhus in Chicken Embryo Membrane.]—*Brasil-Médico* 1936. Feb. 15. Vol. 50. No. 7 pp. 133-134. With 2 figs.

The authors inoculated the chorio-allantoic membrane of 7-10 day embryo chicks with a fragment of spleen from an infected guinea-pig. The eggs were then maintained at 40°C. and examination carried out 3-5 days later of the membrane in contact with the spleen fragment. In the case of 3 of four eggs so inoculated Rickettsia were seen by

section and staining on the third day and in the fourth examined on the 5th day they were more numerous. Further inoculation of guinea pigs with fragments of the membrane triturated in saline set up the disease.

H H S

RETTAXO (Ugo) Recherche du virus exanthématique murin à Rome.
[Search for the Murine Typhus Virus in Rome].—*Boll Sezione Ital Soc Internaz. di Microbiologia* Milan 1935 Oct. Vol. 7 No 10 pp 377-383

It is well known that boutonneuse fever occurs in Rome but so far no cases of endemic typhus have been reported in that city.

Two-hundred and twenty five rats were captured during the years 1932 to 1935 at various seasons of the year and in different localities in the city including over 100 rats from the landing stages on the river.

The rats were killed and emulsions of the brains inoculated into guineapigs but no typhus virus could be isolated. As the author says although this does not exclude the occurrence of typhus virus in the rats of the city it at least means that it is rare.

D H

BRUYOGHE (R.) & JADIN (J.) Culture du virus typhique murin sur la membrane chorio-allantoïdienne de l'embryon de poulet.
[Culture of Murine Typhus Virus on Chick Embryo Membranes].—*C R Soc Biol* 1936. Vol. 121 No 2 pp 153-155

The authors repeated the work of ZIA and DA CUVHA and succeeded in cultivating their Antwerp typhus virus on chick embryo membrane using the method of Goodpasture.

The virus was also passed from embryo to embryo for several generations and was proved to be virulent at each stage by inoculation into guineapigs.

D H

BLANC (Georges) & MARTIN (L. A.) Conservation du virus du typhus murin à basse température. [Preservation of Typhus Virus at Low Temperatures].—*C R Soc Biol* 1935 Vol. 119 No 27 pp 1322-1323

The authors find that if the carcasses of infected guineapigs are maintained in the frigidaire at a temperature of -18°-20°C. the virus of rat typhus of Casablanca can be isolated from the brain of these animals up to 45 days but if rats are kept under the same conditions the virus is still viable up to 169 days.

D H

ZINSSER (Hans) CASTANEDA (M. R.) & HAGER (F. D.) Protective Action of Concentrated Anti-typhus Serum (Murine Type) against European Typhus Virus.—*Proc Soc Experim Biol & Med* 1935 Oct. Vol. 33. No 1 pp 44-47 With 1 fig

Previous trials had shown that antityphus horse serum (murine type) protected animals completely against the homologous virus but only slightly against a European typhus virus (human type).

This same serum was concentrated and it was found that the Weil Felix reaction of the concentrate was much increased and the concentrated serum protected animals against the European virus as well as it did against the Mexican murine virus.

D H

GIROUX (Paul) Mise en évidence, dans le sang circulant, de virus typhique après la période d'évolution apparente de l'infection expérimentale. [Demonstration of the Virus of Typhus from the Blood of Experimental Animals Some Time after the Fever has ceased.]—*C. R. Soc. Biol.* 1935 Vol. 120. No. 40. pp. 1188-1194

The author has found that the best method for obtaining the virus from cases of typhus is to take 10 cc. of blood from a vein, allow the blood to clot, remove the serum, then break up the clot and inject it intraperitoneally into guineapigs. Employing the same method in guineapigs the author was able to isolate the virus readily from animals that had had inapparent infections some 30 days before. D. H.

LÉTRINE (P.) & SAUTTER (V.) Sur la durée de conservation du typhus murin dans l'encéphale du spermophile. [Duration of the Virus of Murine Typhus in the Brain of the Spermophile].—*Bull. Soc. Path. Exot.* 1935. Jan. 8. Vol. 29. No. 1. pp. 13-16.

The authors have previously pointed out that the Macedonian spermophile (*Citellus citellus*) the ground squirrel, is susceptible to typhus virus.

Strains of murine virus have been passaged for one year through these animals without producing any change in the virus. Two animals were inoculated in each series—one of these was killed during the fever for passage of the virus and the others kept for varying periods to determine the longevity of the virus in the brain. Up to the 118th day after the fever the virus was isolated from all animals tested and up to the 226th day many though not all, were still positive—one or two were still positive up to the 374th day. Even after this long duration in the brain the virus gave the same reactions when inoculated into guineapig.

D. H.

NOURY (M.) Présence des virus typhiques dans le moelle épinière. Essais d'atténuation de ces virus par dessication. [Presence of Typhus Virus in the Spinal Cord of the Guineapig. Attempts to attenuate it by Drying].—*Bull. Soc. Path. Exot.* 1935. Dec. 11. Vol. 28. No. 10. pp. 808-809

Two strains of virus were used in these experiments, one a murine virus isolated in Casablanca the other a classical typhus virus from Tunis.

Guineapigs were inoculated and killed during the fever and the cord removed, washed and sectioned—small portions of the cord were emulsified and inoculated into other guineapigs and these developed typical fever with orchitis in the case of the Casablanca virus. No typhus lesions could be found in sections of the cord, nor could Rickettsia be demonstrated.

The virus can be passaged in guineapigs by this method just as readily as if brain emulsion was employed. Desiccation of the cords for 24 hours apparently destroyed the classical virus, but after 3 days drying the murine virus produced a mild attack of fever in one guineapig, and when tested later this animal was immune. D. H.

DARDER (Emilio) & MENEU (Antonio) Dos casos de fiebre exantemática mediterránea. [Two Cases of Boutonneuse Fever]—*Medicina Paises Cálidos* Madrid. 1935 Dec. Vol. 8. No 12. pp. 594-599 With 4 figs. [16 refs.]

The author places these two cases on record because, he states only one case has previously been reported (in 1933) in the Balearic Islands. The present two were a man and his wife living in Mahón (Minorca) where the former was an official at the Naval Base. The former showed several button spots on the abdomen and the latter one marked with a necrotic centre. The course of illness in each case was the usual. The man was taken ill about a fortnight before his wife. He had a bitch with pups and they were overrun with ticks which also invaded his office table and he often killed them with his hands. His wife washed the dogs to rid them of ticks and also killed many in the same way and both may have thus become infected.

H H S

GIRARD (P.) Recherche des cas inapparents de typhus dans les foyers du blé et dans une petite ville de l'intérieur de la Tunisie en 1935 [Research for Cases of Inapparent Typhus in the Regions of the Country around Tunis and in a Small Town]—*Bull. Soc. Path. Exot.* 1935 Dec. 11 Vol. 28 No 10 pp 899-905

Out of 113 contacts with typhus fever 5 gave a rising positive Weil Felix reaction but had no fever or other symptoms of typhus.

The blood of one of these cases was inoculated into guinea-pigs and they developed fever but when tested later were not immune to typhus virus. Of 27 contacts who gave a negative reaction the virus was isolated from 3 these were cases of inapparent infection

D H

CURRAN (E. J.) Some Observations on Fever of the Typhus Group (Vector Unknown)—*J. Roy. Army Med. Corps* 1936 Feb Vol 68 No 2. pp 94-101 With 2 charts.

Ten cases of fever of the typhus group occurred in Jubbulpore in the year 1934 and are described in this paper.

All the cases showed marked constitutional disturbance and indeed resembled clinically the text-book descriptions of true typhus. One case in which symptoms of encephalitis developed ended fatally.

A profuse typhus rash which appeared on or about the 5th day of the fever and spread over the body including the palms and soles and face was noted in all the cases. The pyrexia lasted 15 to 16 days. All the cases gave a positive Weil Felix reaction some of the sera agglutinated Proteus X19 in highest dilution some Proteus XK and in 2 cases Proteus X2.

In none of the cases was there any history of tick or insect bite of any description and an exhaustive search for a possible vector proved futile. The cases were few in number very scattered and bore little or no relation to one another although a number of the patients belonged to one regiment these cases occurred in different companies and in different bungalows and at different periods of the year.

[It is obvious that these cases cannot be classified according to the vector neither can they be classified by the Weil-Felix reaction as, although clinically similar some agglutinated X2 some XK and some X19 in highest dilution.]

D H

CULLEN (Thos.) Report on a Case of Fever belonging to the Typhus Group.—*West African Med. J.* 1935. Nov Vol. 8 No. 1 pp. 15-16.

A case of fever which was clinically typical of the typhus group of fevers. The fever lasted 14 days and a morbilliform rash covered the limbs and body and also was noted on the palms and soles and on the face. The following points were noted (1) rash, (2) the odour, (3) intense headache, (4) duration and character of the fever (5) negative Widal reaction. It was not possible at the time to carry out the Weil-Felix reaction.

D. H.

KUTTER (C. A.) Een tweetal gevallen van Tropical Typhus? [Two Cases of Tropical Typhus?].—*Gesent. Tijdschr. v. Trop.-Med.* 1935. Oct 29 Vol. 75. No. 22 pp. 1896-1903. With 1 fig. [18 refs.]

These two cases, although the diagnosis remained somewhat doubtful to the end, deserve a record if only to show how difficult a decision may be. Both showed scrotal lesions which are regarded as "primary". Case No. 1 was one of sudden commencement, acute illness, high fever with rigors, a somewhat swollen penis and painful enlarged inguinal glands. At first there was no abnormality of scrotum or testis. Soon there appeared necrotic areas on the prepuce and erosions on the scrotum. These necrotic areas spread over penis and scrotum. Serum tests on the 7th day proved puzzling—typhoid and paratyphoid B negative. Proteus Y19 O positive with coarse flocculation 1-100, weakly positive 1-600 with fine flocculation. Proteus XKKO lys 1-600 with clarification, partial lysis and coarse flocculation 1-1,000. By the 12th day all serum tests were completely negative.

After considering all the possibilities the conclusion came to is that this was a patient infected with tropical typhus on the scrotum or penis and that the necroses were due to primary local vascular changes.

In the second case, which was fatal, there was marked jaundice and again a scrotal lesion in the shape of an ulcer on the raphe at the base of the penis. Serum tests gave typhoid positive 1-2,000 paratyphoids and tropical typhus negative. In spite of these findings and in spite of jaundice, the author considers, on clinical grounds that the case was one of tropical typhus and that the scrotal ulcer was the primary lesion.

W. F. HARR.

LITRICE (P.) Sur l'existence, en Indochine, de trois espèces de fièvres exanthématisques. [Three Varieties of the Typhus Group of Fevers occurring in Indo-China].—*Bull. Soc. Path. Exot.* 1935 Jan. 8. Vol. 29 No. 1 pp. 16-19 [11 refs.]

The author considers that it has been proved that there are at least 3 types of typhus fever in Indochina —

i. Historic typhus carried by lice.

ii. Endemic typhus carried by the rat flea.

iii. Japanese River Fever carried by a mite.

Further research is necessary to determine the relationship between some River fever and similar fevers met with in Malaya, Sumatra, D. H. Indochina.

MEYER (H. F.) Latent Infections—*Jl Bacteriology* 1936 Feb
Vol. 31 No. 2 pp 109-135

Among other conditions inapparent infections in typhus are discussed the author prefers the term latent infection D H

MASSIAS (Charles) Typhus tropical bénin typhus endémique à Tra vinh (Cochinchine)—*Bull Soc Méd-Chirurg Indochine* 1935 Oct. Vol. 13 No. 8 pp 1040-1045 [19 refs.]

RAGIOT (Ch.) DELBOVE (P.) NGUYEN VAN HUONG & HO-THEU-NGAN Fièvre typho-exanthématique avec fièvre typhoïde associée. [Typhus associated with Typhoid Fever]—*Bull Soc Méd-Chirurg Indochine* 1935 July-Aug Vol. 13 No 8 pp 762-766.

A case of fever with typhus-like rash swollen face injected conjunctiva and delirium the patient died on the 9th day. The *Bact typhosum* was isolated from the blood the Widal reaction was positive and the Well-Felix reaction was negative. Blood taken from the patient during the fever and injected into guinea-pigs produced fever in these animals and orchitis. When tested later with a true typhus virus these animals were found to be immune D H

LEWISWAITE (R.) The Pathology of the Tropical Typhus (Rural Type) of the Federated Malay States—*Jl Path & Bact.* 1936 Jan. Vol. 42. No 1 pp 23-30 With 8 figs. (4 coloured) on 3 plates.

This paper deals with the morbid anatomy of rural typhus in man and the histopathology of the brain in that disease. The description of the gross pathology is based on the findings of 12 autopsies made by the author at the District Hospital in Kuala Lumpur. It may be said that naked eye examination gave no single consistent feature that could be regarded as peculiar to tropical typhus the few pathological changes noted may all be met with in the morbid anatomy of other tropical diseases.

Morbid histology of the brain—This examination was made in 7 cases in 2 no lesions could be detected after prolonged search.

In rural typhus the microscopic findings in the brain are meagre but all the lesions described by previous workers in the brains of human cases of louse-borne typhus could be found in one or other of the brains examined. The lesions in the brain in cases of rural typhus differ only in degree and number from those found in epidemic typhus. The principal lesion consists of a slight perivascular proliferation of neuroglia cells one or two cells in depth along the course of capillaries or arterioles these vessels also show a slight degree of swelling of the endothelial cells. In a few instances this lesion was well marked and merited the term typhus nodule. These lesions are beautifully demonstrated in figures which also show Rickettsia in the cytoplasm of the swollen endothelial cells. D H

SPARROW (Hélène) & ROUSSEL (Henri). Fréquence remarquable de *Proteus V19* au cours d'une épidémie de typhus. [Frequent Isolation of *Proteus V19* in an Outbreak of Typhus Fever]—Arch. Inst. Pasteur de Tunis. 1936. Jan. Vol. 25 No. 1 pp. 53-71. (10 refs.)

Reference is made to previous work on the subject of the isolation of strains of *Proteus V19* from cases of typhus. In some epidemics although cultures were attempted from many cases it has not been possible to isolate *Proteus* strains from any of the patients in other epidemics cultures of *Proteus V19* have occasionally been obtained.

In the present research bloods sent to the laboratory for agglutination and Wassermann reactions were used for cultural purposes. The serum was first drawn off and the clot broken up and placed in broth tubes and incubated. Four hundred and one samples of blood were tested as follows—

	Results	
	V19	Per cent
65 cases of typhus	37	56
48 suspected cases of typhus	1	
129 other fevers	11	8.5
174 contacts healthy	0	
35 syphilites	0	
—	—	—
401	44	11.0

In the 65 cases of fever definitely diagnosed as typhus 44 gave a positive Weil-Felix reaction and a strain of *Proteus V19* was isolated from 13 of these and from 21 cases in which the Weil-Felix reaction was not positive (early cases mostly) *Proteus V19* strains were isolated from 19 or practically in every case. Although the bacillus could be most readily isolated from the cases before agglutinins had developed yet in one instance a strain of *Proteus V19* was isolated from the blood of a patient giving a very high titre of agglutination and also two cases of convalescents after fever had ceased.

All the cultures resembled one another biologically lactose to change glucose, maltose and saccharose acid+gas indole produced and gelatine liquefied all the strains were agglutinated by specific rabbit serum for *Proteus V19* and also by the serum of cases of typhus both in the O and H forms.

D H

KAXAREWSKAYA (A. A.) & BOGOMOLOW (I. L.). Die Agglutination gegenüber *Proteus V19* im Liquor bei Fleckfieber. [Agglutination for *Proteus V19* in the Spinal Fluid of Typhus Patients]—Arch. Sci. Biol. 1935. Vol. 38. No. 2 [In Russian pp. 539-542. German summary p. 543.]

The cerebrospinal fluid was tested for agglutination of *Proteus V19* in 44 patients suffering from typhus fever. In 28 of them there was a positive result in low dilution 50-70 times less than in blood serum. In convalescence the agglutinins usually disappeared, in two only was there a residual agglutination and that in very small degree. It is believed that the agglutinins are not produced locally but have resulted from passage from the blood to the spinal fluid.

H H S.

- i. DELVILLE (J P) Recherche des bacilles du groupe *Proteus* à chez les animaux inoculés avec les différents virus des typhus. [Bacilli of the Proteus Group in Animals Inoculated with Typhus Viruses.]—*Arch Inst Pasteur de Tunis* 1936 Jan Vol. 25 No 1 pp 147-148.
- ii. — Recherche des bacilles du groupe *Proteus* à chez les rats du port et de la ville de Tunis. [Search for Bacilli of the Proteus Group in the Rats of the Port and Town of Tunis.]—*Ibid* pp 142-146

i. Cultures were made from the blood brain and spleen of experimental animals (rats mice rabbits guineapigs cats and monkeys) infected with typhus virus 125 animals in all were investigated but from none of the cultures could any bacillus of the Proteus group be isolated.

ii. Two hundred wild rats captured in the port of Tunis were examined in the same way. Three strains of *Proteus* were isolated but these strains were not agglutinated by specific *Proteus Y19* sera or by the sera of typhus cases. However after subculture the strains were eventually agglutinated by *Proteus Y19* rabbit serum but still not by sera of cases. The author considers that these strains were in a state of transformation from *Proteus vulgaris* to *Proteus Y19* D H

DELVILLE (J P) Etude comparative de la production des agglutinines anti *OX19* chez le lapin neuf et chez le lapin typhique [Agglutinins of *Proteus OX19* in Rabbits Inoculated with Proteus and with Typhus Virus.]—*Arch Inst Pasteur de Tunis* 1936 Jan. Vol 25 No 1 pp 149-153 With 4 figs.

If rabbits are inoculated with typhus virus, agglutinins for *Proteus OX19* appear about the 20th day whereas if rabbits are inoculated with the bacillus the agglutinins appear about the 5th day after the inoculation. In rabbits which have previously been infected with typhus virus and are subsequently inoculated with killed cultures of *Proteus Y19* the agglutinins for this bacillus appear earlier than they do after injection of normal rabbits. D H

GAUD & NAIN Note sur le parasitisme du chien à Rabat par le *Rhipicephalus sanguineus* [Note on Prevalence of Ticks on Dogs in Rabat.]—*Bull Soc Path Exot* 1935 Oct 9 Vol. 28 No 8. pp 718-719

An investigation of the number of *R. sanguineus* on dogs in Rabat was made.

These ticks are very numerous on the dogs during the months April to November and practically disappear during December January and February.

Cases of boutonneuse fever are most common from May to August when the number of ticks on the dogs is at its peak. D H

VAN LOGHEM (J J) Een proteus-X Kingsbury-stam in statu nascendi. [A Kingsbury Strain of *Proteus* in Process of Development.]—*Nederl Tijdschr v Geneesk*. 1936 Feb 29 Vol. 80 No 9 pp 817-824. With 5 figs. English summary

More than ten years ago the author isolated a strain of *Proteus* from the faeces of a child in Amsterdam. The strain was indologenic and (94)

designated FA_{12} . Sera from patients with scrub-typhus agglutinates it to a certain degree and this peculiarity is explained by a splitting of the strain in colonial growth, whereby some colonies were composed of non-indologenic organisms which were agglutinated by scrub-typhus sera to the same titre as a genuine Kingsbury strain. The author also showed that the V element of *Proteus VK* is not only agglutinated by scrub-typhus serum but is itself an antigenic component. A *Proteus VK* rabbit serum agglutinates V subcultures of the strain FA_{12} but not other subcultures. He hypothesizes λ elements in the mosaic of the O-antigen of all ordinary *Proteus* strains. "V-strains are ordinary *Proteus* strains in which λ -elements are dominating by adaptation or regression. The V19 element is always connected with production of indol." H H S

SCALES (C.) Some Observations on the Weil-Felix Reaction.—J. Roy. Army Med Corps. 1935. Vol. 65. No. 5 pp. 317-312

In this investigation concentrated O emulsions of *Proteus V* 17 and VK were employed and the technique followed was exactly the same in each case. During the year 1934 17 cases of fever of the typhus group gave positive Weil-Felix reactions, 2 for *Proteus V* 9 for $\text{V}19$ and 6 for VK . The range of titre of agglutination in these cases varied from 1/500 up to 1/100 000 and the maximum titre was usually obtained from the 8th to the 14th day of the disease. When the sera of some of these people was retested 3 to 6 months later none of them gave a positive reaction. The sera of 150 normal people, Indians and British gave negative results. In 8 cases of enteric fever (blood culture positive) the Weil-Felix reaction was negative but in 8 cases of typhus fever there was a definite increase of the inoculation sera titrins for *Bac. paratyphiatum B*. D H

SAYOOR (Sadashivrao R.) CASTANEDA (M. Ruiz) & ZINSSER (Eduard) Notes on the Weil-Felix Reaction in Individuals not suffering from Typhus.—Proc Soc Experim. Biol. & Med. 1935. Dec. Vol. 33. No. 3. pp. 365-368.

The sera of 600 individuals was tested only 4 gave a positive reaction in a dilution of 1/100 and 25 in 1/80.

The sera of persons (25) born in Russia gave on the whole lower reactions than the sera of persons born in America. D H

LÉPINE (P.) La réaction de Weil-Felix chez les chiens d'Athènes [The Weil-Felix Reaction in Dogs in Athens].—C. R. Soc. Biol. 1936. Vol. 121. No. 7 p. 634

During the months February to November in 1934 the sera of 23 dogs was examined for the Weil-Felix reaction. Forty-six or 17 per cent gave a positive reaction for *Proteus OX19*.

The author considers that these positive reactions are due not to the virus of typhus but to that of boutonneuse fever the dogs were infested with ticks and these ticks were found to carry the virus of boutonneuse fever. Cases of this disease were occurring in Athens at the time. D H

BLANC (Georges) NOURY (M) & BALTAZARD (M.) Préséance et prémunition au cours du typhus exanthémique et au cours de l'infection inapparente par virus bilisé [Premunition in the Course of Typhus Fever and in the Course of Inapparent Infection after Bile Treated Vaccine]—*C R Acad Sci* 1935 Dec. 9 Vol. 201 No 24 pp 1226-1227

Préséance is defined as a condition due to the presence of a living germ in the body which prevents infection by further doses of germs of the same species

It has been noted by the authors that when people have been inoculated with the living bile treated typhus virus in the presence of an epidemic of typhus that epidemic has forthwith ceased.

The authors explain this occurrence in the light of the condition of préséance in these inoculated people such a condition is only possible after inoculation with living virus.

In the present paper they bring forward experimental evidence in favour of this theory Fifteen persons were inoculated with minimal doses of bile treated virus 10 of these were reinoculated 7 days later with pure virus only 4 out of the 10 had fever 40 days after the initial inoculation all the 15 inoculated people were given doses of pure virus and only one a European who had not received the second inoculation reacted.

D H

NICOLLE (Charles) & LAIGRET (J.) Vaccination contre le typhus exanthémique à l'aide du virus typhique vivant desséché et enrobé. [Vaccination against Typhus by means of Laigret's Dried and Coated Virus.]—*Arch Inst Pasteur de Tunis* 1936. Jan. Vol 25 No 1 pp 40-54 With 6 charts.

The method of preparation of the vaccine was as described in the paper by LAIGRET above (p. 427) double envelopment of dried virus (Tunis murine No 1) in yolk of egg and oil. This envelopment does not neutralize the virus in any way but localizes it. Of 9 people inoculated with a vaccine in which the virus was enveloped in yolk of egg and water 5 developed mild attacks of fever One hundred and fifty three people were inoculated with a dried virus in oil—only one of these contracted fever One hundred and ten people inoculated with the virus in yolk of egg and oil—none contracted fever It was noted during the investigation that rat brain used as source of virus is more likely to cause fever than guinea pig brain the following method of dosage has therefore been adopted —

1st dose	1/200 of guinea pig brain.
2nd dose (25 days later)	1/200 rat brain.
3rd dose (test dose)	1/50 to 1/12 rat brain.

No reaction to test dose in any case.

D H

SPARROW (Hélène) Essais d'immunisation avec le virus murin I de Tunis introduit par la voie nasale. [Attempts at Immunization with the Tunis Rat Typhus Virus by the Nasal Route]—*C R Acad Sci* 1935 Dec. 23 Vol. 201 No 26 pp 1441-1443

A few drops of emulsion of the brain of infected rats (Tunis murine Virus No 1) were instilled into the nostrils of rats and guinea-pigs only one rat developed fever but all the animals when tested later were found to be immune to a true typhus virus.

A few drops of the same murine virus No. 1 were instilled into the nostrils of a young man. 10 days later he developed fever and passed through a typical attack of mild typhus.

D. E.

SPARROW (Hélène) Essais de vaccination avec les rickettsias du virus murin I de Tunis. [Attempts at Vaccination with Rickettsia of Tunis Rat Typhus Virus.]—*C. R. Acad. Sci.* 1935. Dec. 30 Vol. 201 No. 27 pp. 1524-1525.

NICOLLE (Charles) Réflexions au sujet de la note précédente de Mme Sparrow.—*Ibid.* p. 1528.

The author has noted that if lice are fed on patients suffering from endemic typhus in Tunis they do not become infected but she has succeeded in infecting lice by the rectal injection of Tunis mouse virus No. 1.

The infected lice die on or about the 4th day with large numbers of Rickettsia in the intestine.

The contents of 5 to 10 infected lice intestines were injected subcutaneously into guinea-pigs and rats—none of the animals developed fever but when tested later 4 out of 6 guinea-pigs were immune to a true typhus virus and 4 out of 5 rats were immune to the rat virus No. 1. The method of instilling the louse virus into the nostrils and conjunctiva of rats and guinea-pigs was also employed—none developed fever but immunity was produced. The same virus dropped in the conjunctiva of a young man produced no reaction whatever.

Professor Nicolle in a footnote emphasizes the point that passage of Tunis rat virus No. 1 through lice attenuates the virulence of the virus for experimental animals and for man.

D. E.

GROED (Paul) & PROTZ (Harry) Essai sur les variations du pouvoir infectant et vaccinant des cultures des virus typhiques en fonction des voies d'introduction. [Variations in the Infecting and Vaccinating Power of Cultures of Typhus Virus according to the Route of Infection.]—*C. R. Soc. Biol.* 1936. Vol. 121 No. 4 pp. 311-313.

Cultures of typhus virus obtained by the method of Nigg and Landsteiner were employed in this research.

The cultures were introduced into experimental animals by various routes, intracerebral, conjunctival, nasal, by the digestive route, on the scarified skin and intradermally. Of these routes the intradermal, subconjunctival, and nasal gave the greatest number of infections and produced the best vaccinating effects.

D. E.

LE CHUTTOV (F.) MOYDON (H.) BEZIÈRE (Ch.) PERRAUXIER (J.) & DUMASSEZ (J.) Importance de la voie testiculaire pour la mise en évidence chez le cobaye du typhus endémique observé chez l'homme. [Importance of the Testicular Route in Infected Guinea-pigs with the Virus of Endemic Typhus from Man.]—*Bull. Acad. Méd.* 1935. Dec. 3. 89th Year 3rd Ser. V. L. 114 No. 38 pp. 530-532.

It has always been difficult to isolate the virus of endemic typhus from cases of the disease especially so in the case of the Toulon ship virus.

The authors now find that if blood taken at the height of the fever is injected directly into the guineapig testicle instead of intraperitoneally the virus can be recovered in a large percentage of cases. D H

DUBOIS (A.) & NOËL (G) Essais d'immunité avec la souche de typhus exanthémique de l'Urundi. [Immunity Experiments with Typhus Virus from Urundi, Congo]—*Ann Soc Belge de Med Trop* 1935 Sept. 30 Vol. 15 No 3 pp 349-359

The author brought 2 strains of typhus in guineapigs from Urundi Congo to Belgium. One strain was obtained directly from the blood of a case of fever the other from lice fed on a case of fever.

When inoculated into rats these 2 viruses did not produce fever but when tested later these animals were found to be immune to typhus virus also when Congo virus was injected into rabbits the serum of these animals gave later a positive Weil Felix reaction. This virus produced fever but no orchitis in the guineapigs. Guineapigs which had recovered from fever caused by the Congo virus proved to be protected from inoculation with a European rat typhus virus and vice versa. The conclusion is that the Congo virus is a true typhus virus of the human type. D H

ZIA (Samuel H.) & WU (Chao-Jen) Protection against Experimental Typhus Infection (Peiping Strain) with Immune Mexican Typhus Serum.—*Proc Soc Experim Biol & Med* 1935 June. Vol 32. No 9 pp 1406-1408 With 2 charts.

The authors obtained some of Zinsser's antityphus horse serum from America and tested its protective power against a local strain of human typhus virus.

Guineapigs were injected with 1/15 of a suspension of the brain of an infected guineapig and 24, 72 and 120 hours later 1 cc. of immune serum was injected. Normal serum was injected into control animals. None of the animals receiving the immune serum developed fever all controls reacted. D H

LE CHUITROV BERGE (C) & PENNANÉAC H (J) Transmission expérimentale au chat du typhus murin (souche toulonnaise). Premières considérations sur cette transmission. Présence du virus dans l'urine. [Experimental Infection of the Cat with Rat Typhus Virus]—*Bull Soc Path Exot*. 1935 Oct. 9 Vol. 28. No 8. pp 685-688

The virus used in this investigation was a rat typhus virus isolated from rats in the ships of war in Toulon Harbour.

Young cats were injected with emulsion of brain of infected guineapigs these cats had a few days fever without orchitis and the brain and urine of the cats was shown to be infective. Cats were also infected by being fed on the brains of guineapigs. The virus after passage through cats showed some loss of virulence for the guineapig. D H

PARKER (R. R.) Rocky Mountain Spotted Fever. Epidemiology with Particular Reference to Distribution and Prevalence in the Western United States.—Reprinted from *Northwest Med.* Seattle, 1935. Apr. Vol. 34 No. 4 pp. 111-121 With 9 maps & 6 charts. [11 refs.]

Since Rocky Mountain spotted fever was first [1890] recognized as a specific infection in the northern Rocky Mountain region of the United States there has been a vast extension of the geographical limits within which endemic foci are known to be present. The territory now included involves a very large part of the United States and extends northward into at least southern Canada. In the western United States the pushing out of the known limits of endemicity has been more or less gradual over the past thirty years, but definite knowledge of occurrence in the Mississippi valley and eastern states has essentially all been secured within the past three years.

The above is the thesis of this able study of the epidemiology of Rocky Mountain fever.

Figures are given of the number of cases of the disease reported and these cases are shown graphically on a map of the western States, the interesting point being that all these areas of prevalence lie within the range of the Rocky Mountain wood tick *Dermacentor andersoni*.

It is noted that there is a definite cyclic prevalence of the disease in the western States—there may be many cases in one year and few or none for a year or two followed again by a year with many cases. In one area a few cases each year were noted for 4 years followed by a period of ten years without any cases when the disease again appeared. The explanation of this cyclic prevalence lies probably not so much in the relative abundance or scarcity of ticks but in the number of ticks which are actually carrying the virus.

As regards the spread of the disease to other areas the question is discussed whether this is a true outward expansion of the endemic areas or whether the disease has occurred there previously and escaped detection. The following possibilities are suggested to account for the regional distribution as at present known. (1) That long ago foci of Rocky Mountain spotted fever were scattered throughout a much larger part of the Rocky Mountain region than was then suspected or has since been generally supposed. (2) that from such foci there has been an intensive dispersal of the virus to adjacent territory but only within the *D. andersoni* range. (3) that this dispersal has been accomplished by the intensive spread of *D. andersoni*. But there is no evidence that *D. andersoni* has become established in the eastern or central States in these States *D. variabilis* and *occidentalis* and possibly *R. argenticornis* are concerned. As regards the occurrence of Rocky Mountain fever in the eastern States the question again arises, is this a new disease in these areas or has the disease been present there for many years and unrecognized? If the disease has recently been imported into these new areas out of the range of *D. andersoni* is it by means of importation of infected *andersoni* ticks? The author considers that there is no evidence of spread by this means but suggests that the rabbit tick, *H. leporis palustris* may be responsible for the spread of the virus, although not directly responsible for human cases of the disease as it does not bite man—this tick is not confined to the Rocky Mountains but is found on most species of rabbits wherever these small rodents are found in the United States. Thus the virus of

spotted fever may have existed as it is known to exist at present in nature in a low grade phase that does not produce frank recognizable infections in man and such strains of virus may sooner or later assume an increasing virulence and become capable of causing clinically recognizable symptoms. This virus is spread and kept alive in the rodent population by the rabbit tick and occasionally conveyed to man by ticks such as *D. andersoni* and *variabilis* which bite both rodent and man.

D H

- i. BENGTSTOV (Ida A.) & DYER (R. E.) Cultivation of the Virus of Rocky Mountain Spotted Fever in the Developing Chick Embryo.—*Public Health Rep* 1935 Oct 25 Vol 50 No 43 pp 1489-1498. With 3 plates [19 refs.]
- ii. LILLIE (R. D.) Histologic Reaction to the Virus of Rocky Mountain Spotted Fever in Chick Embryos.—*Ibid* pp 1498-1501

i The method of Goodpasture was employed and the virus selected for experiment was the Bitterroot strain of Rocky Mountain spotted fever

A small window was cut in the egg shell and the membrane was infected by means of a syringe the inoculum in the first case being a few drops of emulsion of infected guineapig brain and, later emulsion of infected chick embryo membrane in series. (Twenty such passages were made.) The window was vaselined around the edge and covered with a sterile cover slip and was observed through a dissecting microscope. It was noted that many of the embryo chicks died on the 5th to the 6th day after the inoculation that these fatalities were due to the virus was probable because control embryos inoculated with endemic typhus virus did not succumb. It was found by experiment that the virus was not confined to the membranes but its presence could also be demonstrated in the organs of the chick especially the liver and brain. Infected membrane viewed through the cover glass window showed small discrete cloudy areas which subsequently coalesced.

Rickettsia were found in the cytoplasm of the epithelial cells in all generations after the tenth. Emulsions of the infected membranes from 54 infected eggs were injected into guineapigs 104 were inoculated and all developed fever and showed symptoms identical with that produced by the virus from the tick.

Seventy two out of 80 guineapigs died 6 of those which recovered were tested with the Bitterroot virus and proved to be immune.

ii Sections were cut out of the entire chick embryo these were stained by Romanowsky Weigert and van Gieson stains and studied.

Lesions began to appear on the 9th or 10th passage generation about the same period that Rickettsia began to appear.

The significant features of these lesions appear to be vascular adventitial proliferation lymphocytic infiltration and occasional endovascular lesions.

D H

- OGATA (Norio) Die Tsutsugamushi-Krankheit. Rickettsia tsutsugamushi. [Tsutsugamushi Fever Rickettsia tsutsugamushi].—*Arch f Schiffs u Trop Hyg* 1935 Dec Vol 39 No 12 pp 491-505 With 8 figs.

A review of work done by the author and other Japanese research workers on tsutsugamushi fever read before the Institute of Tropical Diseases in Hamburg in November 1935

In his summary of the review the author states that the problem of the aetiology of the fever which had engaged the attention of research workers in Japan for 50 years was finally solved by his discovery in the year 1927 of the cause of the disease Rickettsia tsutsugamushi, by the injection of the blood of cases of the fever into the testicle of rabbit and passage of the virus by this means for many generations, the Rickettsia being readily demonstrated in the testicular tissues by various staining methods.

The author has also shown that the mouse is a very suitable animal for experimental work and tissue culture of the virus has been usefully employed.

D H.

KOSHIDA (Shiruo) On the Tissue Culture of Tsutsugamushi Virus (*Rickettsia tsutsugamushi*) — *Kaisaku Arch. Experim. Med.* 1936. Oct. Vol. 12 No 4 pp 324-337 With 6 figs. on 1 plate

The inoculum employed in these experiments was the infected parenchyma of rabbit a testicle.

The medium consisted of 1 drop of infected extract of testicle in Ringer's fluid and 2 drops of heparinized rabbit plasma. The slide cover slip method was employed and the specimens were incubated at a temperature of 28° to 32°C. Every 3 or 4 days specimens were stained and examined and animals were inoculated from the cultures. Rickettsia appear on or about the 8th day and after 2 weeks cultures are found in 100 per cent. of the cultures.

The virus could be kept alive in culture up to 36 days without transplantation, but can be kept much longer by addition of fresh plasma and fresh tissue cells.

The author refers to his method of "total staining" this consists in taking the cover slip on which the culture rests, allow the cells to settle on the glass and remove all the fluid media, fix the cells then wash thoroughly and stain. This gives much better results than most preparations of the cells

D H.

KOUWENAAR (W.) & WOLFF (J. W.) Sumatraniches Milbenfever. Eine Krankheit der Fleckbeberguppe. [Sumatra Mite Fever] *Zent f. Bak.* I Abt. Orig. 1936. Jan. 13. Vol. 135 No. 7/8 pp. 427-436. With 4 figs. [16 refs.]

This paper is a résumé of work done in the Dutch East Indies by the authors on the 3 types of the typhus group of fevers which occur there, and already noted in the *Bulletin*.

- | | | |
|------------------------|---------------|-----------------|
| 1. Sumatran mite fever | λK | + primary sore |
| 2. Scrub typhus | λA | no primary sore |
| 3. Endemic typhus | $\lambda J 9$ | " |

Experimental work on the viruses of these diseases and the virus of Japanese river fever employing rats, rabbits, guinea-pigs, mice and monkeys is very fully reported. The conclusions arrived at are that Sumatran mite fever and Japanese river fever are not identical although clinically they resemble one another very closely. The virus of Sumatran mite fever produces a severe and often fatal disease in guinea-pigs and a mild infection in monkeys whereas the reverse is the case with the virus of Japanese river fever also monkeys which have recovered from Japanese river fever are susceptible to the virus of Sumatran mite fever.

The authors also consider that scrub typhus is Sumatran mite fever without the primary sore [see also O'CONNOR above]

The primary sore in Japanese river fever and in Sumatran mite fever is due to the injection of the virus by the mite directly into the skin if scrub typhus is carried by a tick this vector would inject the virus not directly into the skin but subcutaneously and this might explain the absence of the primary reaction in these cases.

[This suggestion of the authors is not applicable in the case of boutonneuse fever and African tick bite fever both of which are carried by ticks and in both primary sores are almost invariably present]

D H

BESSEN (N) Een geval van Mijtkoorts in de Westerafdeeling van
Borneo [A Case of Mite Fever in the Western Division of Borneo]
—Geneesk Tijdschr v Nederl Indie 1935 Oct 29 Vol 75
No 22 pp 1909-1910

This case appears clearly to have been one of mite fever. The disease occurred in a full European 55 years of age. On admission to hospital with a temperature of 39.4°C. ten days after its commencement he complained of severe headache and pain in the loins his face was suffused, the conjunctivae injected the mouth and lips dry and he looked ill. There was a painful lymph node in the groin corresponding to a skin lesion of the size of a pin head on the scrotum. Around the lesion the primary lesion there was bleeding and hyperaemia. The patient became dull had severe cough without sputum and a continuous temperature ranging between 38°C. and 40.5°C. Urine and faeces showed nothing abnormal. He died 12 days after admission. The diagnosis was clinched by the serological findings negative agglutination for *Proteus* λ19 and positive 1-1,500 for *Proteus* λ Kingsbury while the agglutinations for typhoid and paratyphoid organisms were negative.

W F Harvey

PAPPATACI FEVER.

COCOLLO DUQUE (José) Una epidemia de papataci en Arjona, Bolívar (Colombia) [An Outbreak of Pappataci Fever in Arjona].—*Boletín Oficina Sanitaria Panamericana* 1935. Dec. Vol. 14. No. 12 pp. 1143-1146.

Malaria is usually widespread in November onwards after the heavy rainfall of August and October but dies down early in the year. In March 1935 however there were many cases of fever and these were at first diagnosed as malaria, but it was soon noticed that the fever lasted for about 3 days only and was accompanied by intense headache and general pains, redness and congestion of the eyes and, in short, the typical symptoms of pappataci fever. Epistaxis was not uncommon and in children convulsions occasionally. There was considerable depression with headache and asthma after the fever and convalescence was delayed for 1-2 weeks. The outbreak kept on until July and about 25 per cent. of the population (which was about 15 000) were attacked.

H H S.

PESCHLE (Bruno) Osservazioni cliniche su un'epidemia di febbre da papataci [Observations on an Outbreak of Pappataci Fever].—*Pediatria* 1936. Jan. 1 Vol. 44 No. 1 pp. 41-51 English summary (6 lines)

The author has made an exhaustive clinical study of an outbreak of pappataci fever which occurred in Istria in 1933. Persons of all ages—adults, school children, children of pre-school age, and infants below 2 years—were attacked. Whereas in adults and older children the symptoms and clinical course were typical and presented no difficulty in diagnosis in the infants and young children many of the characteristic features might be lacking and diagnosis difficult especially in sporadic cases. There is no need here to speak of the classical symptoms of a typical attack but attention should be called to the differences which the author noted in children. Whereas the fever in adults was about 40°C. in some cases it might be higher in infants, but in still more it kept low 38°C. and came to normal by the second or third day. Even when it was 40°C. there was no marked constitutional disturbance. The bradycardia, usual in adults, became less with fall in age and in infants was never seen. Convulsions at the onset were seen only in patients over 12 months old and then not unless the fever was high. The persistent redness of face and neck was always present in those over 2 years lasting even after the fall in the temperature, and was a useful diagnostic sign. Scarletiform rashes in the region of the joints were seen in about one-fifth of those of pre-school age, herpes, frequent in adults, was seen only once among the children, a boy of 12 years. Epistaxis, common in adults and in late childhood (40 per cent. of the last showed it) was present in only 5 per cent. of those between 5 and 10 years and not seen at all in infants. Diarrhoea, with loose, mucoid, fetid stools, occurred in 70 per cent. of children of school age even on the first day of illness. Vomiting was present in about half the infants, but never severe. In about 30 per cent. of older children and in 10 per cent. it recurred on successive days. In adults and older children leucopenia with relative lymphocytosis and monocytosis was the rule but in infants half showed leucocytosis with relative

polymorphonuclear increase and there was no eosinophilia in fact in 67 per cent, there was a reduction. Nervous sequelae were never seen in children. Prognosis is always favourable no fatalities occurred.

H H S

THEODOR (Oskar) A Study of the Reaction to *Phlebotomus* Bites with Some Remarks on "Harara."—*Trans Roy Soc Trop Med & Hyg* 1935 Nov 25 Vol. 29 No 3 pp 273-284

The reaction to sand fly bites is allergic in nature. The disease called harara in Palestine is the result of these bites in a sensitized subject.

The author studied the effect of successive bites by *Phlebotomus papatasii* on some 17 subjects who had not previously been bitten. After the first occasion of being bitten the reaction usually takes several days to develop then intensely itching papules appear. After subsequent bites the papules appear more rapidly (less than one day) and the site of the preceding bites may become inflamed again. This is interpreted as a process of progressive sensitization to the antigen in the insect's saliva. In subjects who have been repeatedly bitten large pale wheals develop locally within a few minutes and these are followed by the papular reaction. This is regarded as the beginning of desensitization. Ultimately the papular reaction is entirely wanting. Theodor supports the view of DOSTROWSKI that the disease known as "harara" in Palestine is nothing else than the reaction to *phlebotomus* bites.

V B Higginbotham

OROYA FEVER.

WEINMAN (David) Les parasites érythrocytaires révélés par la splénectomie Bartonella et Eperythrozoon. [Bartonella and Eperythrozoon revealed by Splenectomy]—102 pp. [11 pages of refs. 1935] Paris Amédée Legrand, Editeur 93 Boulevard St. Germain.

Since the discovery by BARTOV in 1901 of the bacillus-like organisms in the blood of a case of Oroya fever and their naming *Bartonella bacilliformis* by STRONG and his co-workers in 1915 and the important observation of MAYER, BORCHARDT and KIRKUTA in 1928 of the appearance of similar organisms which they called *Bartonella microtis* in the blood of rats after splenectomy a very extensive literature has sprung up on the conditions in animals following splenectomy and the occurrence of *Bartonella*, of which a number of new species have been established. In addition an entirely new form, named *Eperythrozoon coccoides* by its discoverer was noted in splenectomized mice by VICK SCHILLING in 1928. Already a number of species of this coccus organism have been described, while other types not yet classifiable have come to light. As a subject for a thesis the author has chosen the above-mentioned parasites, and while describing certain experiences of his own has reviewed the 200 to 300 papers which have been published on the subject. This review will undoubtedly be of great service to those who wish to work with these parasites, and is a valuable book of reference.

C. M. Wayne

DENGUE.

CHENEY (Garnett) Appearance of a Dengue-like Fever in Northern California.—Arch Intern Med. 1935, Dec. Vol. 56, No. 6, pp. 1067-1093. With 7 figs. [48 refs.]

Late in the spring of 1934 a patient was seen in San Francisco who presented a clinical picture like that of dengue. Two cc. of whole blood taken from this patient on the 3rd day of fever and inoculated into a volunteer produced the symptoms and signs of inoculation dengue. Subinoculations in 3 other successive persons reproduced the same type of illness in each. Five more similar cases were subsequently detected in the city. Full clinical details of all 10 cases are given in the paper with fever charts which show the typical saddle-backed type of fever. Severe pains in bones and joints, flushed face and eyes, rash, jaundice and itching of the skin were all noted.

The author prefers for the time being to designate these cases as dengue-like fever for the following reasons:

- (1) The vector of dengue fever *Aedes aegypti* has not been found in Northern California.
- (2) It was not possible to prove that these cases were due to filterable virus.
- (3) Nor was it possible to test these people for immunity to the virus of dengue.

D. Harry

O'MEARA (F J) Dengue Temperature Charts.—*Jl Roy Army Med Corps* 1936. Feb Vol. 66 No 2 pp 120-124 With 7 charts.

Seven specimen temperature charts of cases of dengue are given these cases occurred in young male Europeans some in Cairo and some in Calcutta. The cases were mild, bone pains were not severe and did not merit the term break bone. The majority of the charts are of the typical saddle-back type but one shows the 'terminal rise chart of Rogers.

The Widal and Weil Felix reactions and blood cultures were negative

D H

TROPICAL OPHTHALMOLOGY

A REVIEW OF RECENT ARTICLES. XXV

Conjunctivitis—HANADA¹ has described a form of conjunctivitis accompanied by an acute pustular dermatitis due to the invasion of the conjunctival sac by a flying insect which he calls "Pachyscia idia levi." The conjunctivitis is frequently complicated by a diffuse superficial keratitis. Complete recovery is usual in a few days. A two per cent solution of bicarbonate of potassium has been found to be a useful eyewash. The trouble appears to be closely related to that described by Elliott in his *Tropical Ophthalmology* as caused by "Yellow Ant."

Trachoma—MACCALLUM² in his Hunterian Lecture has furnished a comprehensive review of the disease. He describes the changes as generalized flooding of the subepithelial tissue of the membrane with lymphocytic cells—the follicles which are so often present are part of this general exudate, these however differ in no way from the small aggregations of cells found in follicular conjunctivitis. "The numerous underlying sebaceous or meibomian glands are at first affected by simple blockage of ducts and dilatation, the result of pressure by the cellular infiltration. Later the ducts become strangulated by the developing connective tissue which begins to take the place of the lymphocytic exudate. The result is the appearance on the surface of the conjunctiva of numerous bleb-like excrescences." He attributes the changes in pannus to an extension of the lymphocytic exudate to the upper part of the tarsus by way of the subepithelial tissue of the palbar conjunctiva. In early trachoma pannus in this area is the pathognomonic sign of the disease. He emphasises four main points regarding the disease and its diagnosis.

(1) The primary epithelial lesion caused by the virus results in an inflammatory reaction in the subepithelial tissue exhibited by a lymphocytic infiltration. The lymphocytes may be aggregated into follicles but this is not always the case. When such follicles are present they cannot be distinguished pathologically from similar aggregations of cells which occur in follicular conjunctivitis.

(2) This lymphocytic invasion of the subepithelial tissue spreads from its area of inception in the tarsal conjunctiva to the eyelid limbus where changes occur peculiar to trachoma.

(3) The bleb-like excrescences which exude a gelatinous material when ruptured, have no relation to the so-called trachoma follicles of an earlier stage of the disease.

(4) The lymphocytic invasion of the subepithelial tissue penetrates the tarsus, and finally is resolved into connective tissue. Hence results the deformities of the lids which occur in no other form of conjunctivitis.

The last three points differentiate trachoma from any other form of conjunctivitis.

For the twenty-fourth of this series see Vol. 32, pp. 805-822.

¹ HANADA (Han.) On the Ocular Affections caused by the Poles of an Insect called Aobsa-angata-hanaka-kush or Pachyscia Miss Lewis—Tropenkrankheiten Zeitschr. (J. U. S. Assoc. Formosa) 1933, July, Vol. 34, No. 4. [In Japanese pp. 1004-1012. With 2 figs. English summary pp. 1013-1014.]

² MACCALLUM (A. F.) Trachomatous Conjunctivitis. Its Surgery and Pathology—Lancet, 1935, Jan. 23, pp. 213-217.

The author remarks that ophthalmologists can realize with difficulty that the stigmata of the disease are borne by as many as half the inhabitants of the globe. This seems to the reviewer to exaggerate the incidence of the disease.

JULIANELLE & HARRISON³ have conducted experiments which suggest that the follicular inflammation induced by the inoculation of trachomatous material in the eye of the *M. rhesus* is specific of trachoma. Fourteen monkeys inoculated with the material from follicular conjunctivitis, remained unaffected but when subsequently inoculated with trachomatous material developed folliculosis. They conclude that human trachoma can be transmitted to monkeys while human folliculosis cannot. Further investigations⁴ to determine whether the infectious agent in trachoma is filterable tended to show that it is not readily so. MEYERHOFF & HABACH⁵ have found a daily scraping of the conjunctiva followed by friction with some chemical to be successful in the treatment of intractable chronic trachoma. The lids are fully everted after anaesthetization and the membrane is scraped with a curette or a knife. Scraping is followed by friction with a pledget of wool soaked in perchloride of mercury solution 1 in 1000 or some other disinfectant. They suppose that the drug used is carried by the vessels directly to the vascularized cornea and there exercises a beneficial action upon the pannus. They recognize however that the recovery of a smooth conjunctival surface is the main factor in rendering the cornea more healthy. Treatment may be required for several weeks, or even for several months in severe cases. PAPARCO⁶ records a diminution from 81 to 60 per 100 000 in the incidence of blindness (of which trachoma is the chief cause) amongst the Italian population during the past twenty three years. Various factors are responsible, but the chief one is an improvement in hygienic and in housing conditions. DELANOË⁷ has recorded a case of successful human inoculation of acute trachoma. An Arab woman whose children had recently recovered from a long standing eye trouble developed a conjunctival inflammation of great severity. The lids were so swollen that eversion was difficult. The conjunctiva was covered with swollen readily bleeding discrete follicles whose projection injured the bulbar conjunctiva and cornea. Pain and lachrymation were marked features. Improvement took place rapidly under treatment with chaulmoogra oil. The patient's husband who had lost an eye in infancy through smallpox, allowed the conjunctival sac of that eye to be inoculated from his wife. This was effected by using a small wool mop to transfer the infected matter. Both the infected and the healthy membranes were well rubbed with the mops. The husband developed symptoms in a week.

³ JULIANELLE (L. A.) & HARRISON (R. W.). Studies on the Infectivity of Trachoma. II. On the Relation of Human and Simian Folliculosis to the Infection induced by Trachomatous Tissue in Monkeys.—*Amer Jl Ophthalm* 1935 Jan. Vol. 18. No 1 pp 10-14

⁴ JULIANELLE (L. A.) & HARRISON (R. W.). Studies on the Infectivity of Trachoma. III. On the Filterability of the Infectious Agent of Trachoma.—*Amer Jl Ophthalm* 1935 Feb. Vol. 18. No. 2 pp 133-139 [20 refs.]

⁵ MEYERHOFF & HABACH (S.). D'un mode particulier de traitement des formes rebelles du trachome (Le râclage journalier).—*Rev Internat du Trachome* 1935 Oct. Vol. 12. No 4 pp 189-199

⁶ PAPARCO. Sur la diminution du trachome en Italie.—*Rev Internat du Trachome* 1935 Oct. Vol. 12. No 4 pp 200-202.

⁷ DELANOË (E.). Un cas d'inoculation du trachome chez la femme au mari de cette dernière.—*Rev Internat du Trachome*. 1935 Oct. Vol. 12 No. 4 pp. 242-245

and, on being seen about six weeks later was found to be suffering from an ophthalmia similar to that of his wife.

SCHNEIDER⁸ recommends the application of quinine to the conjunctiva. He uses a saturated solution of the bisulphite and applies it on a napkin with firm stroking movements until the membrane assumes a bluish milky colour—usually about one minute is required. The treatment induces some burning sensation, but is much less painful than the application of copper sulphate. The author believes that the drug's action as a protoplasmic poison enables it to destroy pathological accumulations of lymphoid tissue. He records the notes of eight patients who were benefited by the treatment. TAYLOR PROCTOR & RICHARDS⁹ have recorded an important observation. Epithelial scrapings from the trachomatous eyes of a number of Indian children were found to contain Prowazek-Halberstaedter bodies. The scrapings were suspended in sterile nutrient broth (pH 7.3) ground thoroughly in a mortar for five minutes and passed through hard filter paper to remove cellular debris. This emulsion was then filtered through a Elford graded collodion membrane 0.14 mm. thick and of 0.6 micra average pore diameter. One-third of the filtrate was centrifuged and moderate numbers of elementary bodies were found in the sediment. About 1.6 cc. of the sediment was instilled into the conjunctival sac of a volunteer after the membrane had been lightly scarified with a platinum spatula. An acute conjunctivitis resulted in five days. Prowazek-Halberstaedter bodies and free elementary bodies were present in huge numbers. The diagnosis of trachoma was established at the end of six weeks by the occurrence of typical trachomatous pannus. The association of the *Bacillus granulosus* with trachoma in Glasgow has been investigated by MERCHANT & URQUHART¹⁰. They examined 35 cases which they considered to be undoubtedly trachomatous and succeeded in isolating the micro-organism from 7. In 13 other cases colonies were obtained which had its cultural and morphological characteristics with the exception of glucose fermentation. The authors suggest that failure to isolate the organism from suitable cases of trachoma may sometimes be due to the use of cocaine when obtaining the material and sometimes to having allowed insufficient time for the colonies to develop.

Cataract.—WRIGHT & KOMAN NAYAR¹¹ operating on a child aged thirteen months for bilateral congenital cataract found that in the lens of one eye there was a solid cataractous foetal nucleus surrounded by a milky fluid. This was enclosed in turn by an opaque friable shell of cortex. The cataract in the other eye was of a mixed consistence, partly milky and partly friable. The child had suffered from ophthalmia neonatorum from its birth. KHALIL¹² describes Lopez Lacantre's

⁸ SCHNEIDER (Eduard). Local Quinine Therapy in Trachoma. Preliminary Report. —*Amur Jl. Ophthalm.* 1935. July Vol. 16 No. 7 pp. 631-638 [11 refs.]

TAYLOR (P.), PROCTOR (F. I.) & RICHARDS (P.). Etiologic Significance of the Elementary Body in Trachoma.—*Amur Jl. Ophthalm.* 1933. Sept. Vol. 15. No. 9 pp. 511-513. [12 refs.]

¹⁰ MERCHANT (S. Suresh) & URQUHART (Mary). Trachoma: an Investigation into the Question of the Presence of *Bacillus granulosus* (Koguchi) in Cases of Trachoma in Glasgow.—*Brit. Jl. Ophthalm.* 1938. Apr. Vol. 29 No. 4 pp. 201-204.

¹¹ WRIGHT (R. E.) & KOMAN NAYAR (K.). Rare Type of Congenital Cataract.—*Amur Jl. Ophthalm.* 1935. Feb. Vol. 16 No. 2 p. 153.

¹² KHALIL (M.). The Extraction of Cataract by the Electro-Diathermy Method (after Lopez Lacantre of Madrid).—*Brit. Jl. Ophthalm.* 1938. Mar. Vol. 20. No. 3 pp. 167-175. With 2 figs. [14 refs.]

method of cataract extraction by diathermy needle. A special needle is used to penetrate the lens this structure coagulates and becomes firmly adherent when the current is turned on. The lens can then be lifted out on the needle. Penetration of the lens is very easy and adhesion firm. Regulation of the current is important in order to avoid insufficient coagulation or an injury to the neighbouring structures. By this technique all pressure on the globe is avoided and there is no danger of dislocating the lens backwards. Khalil suggests that the necessary strength of current may be estimated by placing a piece of raw meat on the patient's forehead before operation and testing the resistance. Only experience can prove whether the advantages of this operation can compensate for the dangers.

Glaucoma.—KIRWAN¹² has described the characteristic features of the type of glaucoma which is associated with *epidemic dropsy*. Both eyes are usually affected and haloes round lights are a constant subjective symptom. The capillaries of the entire uveal system dilate and an increased permeability of their walls leads to an excessive flow of fluid into the anterior ocular segment. The eye remains white and the pupil remains normal although the intraocular pressure is always of a very high order—rarely below 50 mm. The depth of the anterior chamber is either normal or deeper than normal. Cupping of the optic disc is only found in long-standing cases. The high intraocular pressure does not respond to purgation or to merotics indeed it is advisable to avoid the use of eserine. Trephining should be performed as soon as the visual field is affected. Gastro-intestinal lavage may aid the elimination of bacteria and their toxins. A rice-free diet should be adopted and the patient be advised a change of air from the endemic area. The aqueous humour in these cases has been found to contain a toxin resembling histamine and it is suggested that this is probably the product of specific micro-organisms in the alimentary canal. Kirwan states that if we can find out the organism and its toxin that is the cause of epidemic dropsy we have advanced a considerable distance in the elucidation of the whole glaucoma problem.

Sleeping sickness—BERTRAND¹³ has found that *optic atrophy* is fairly common amongst the inhabitants of Togoland. One type of the disease is secondary to a choroiditis and another type is exactly similar to that which follows arsenical treatment. These diseases are found in persons otherwise apparently healthy as well as in treated and in untreated trypanosomiasis patients. Syphilis is stated to be an unlikely cause of the atrophy as this disease is extraordinarily rare in the country. The author urges that an optic atrophy should not be attributed to tryparsamide unless the eye had been proved by ophthalmoscopic examination to have been healthy before the treatment was begun.

Leprosy—BARROS¹⁴ has found that the acute varieties of leprotic ocular inflammation respond best to some form of desensitization treatment, especially to autohaemotherapy specific treatment should be temporarily suspended during its employment but ordinary local

¹² KIRWAN (E. O. G.) The Ocular Complications of Epidemic Dropsy—*Institut Med. Ger.* 1935 Sept. Vol. 70 No. 9 pp. 485-489 With 3 charts & 4 figs. on 1 plate.

¹³ BERTRAND (Y.) Réflexions sur certaines Malades du fond d'œil observées en pays Cabral.—*Bull. Soc. Path. Exot.* 1935 July 10 Vol. 28 No. 7 pp. 606-611

¹⁴ BARROS (J. Mendoça) Lepra ocular—tratamento—*Rev. Leprologia do S. Paulo* 1935 Num. especial. pp. 103-107
(694)

treatment should be carried out. Epiphora-conjunctival leprosy and hyperplastic forms of keratitis should be treated by excision and cauterization. Treatment by gold salts has proved disappointing. AMENDOLA¹⁴ stresses the advantages of tarsorrhaphy in cases of paralysis of the orbicularis caused by the disease. Marked involvement of the iris is considered by him to contraindicate an iridectomy. Hyperplastic lesions of the cornea should be operated on "for it brings about an arrest in the course of the disease (Pinkerton's rule)." Treatment of acute ocular lesions should be adapted to the circumstances of the individual patient.

Cholera—BRADURI¹⁷ has recorded some observations on the ocular complications of cholera. These complications are mostly due to the great loss of fluid by purging, though toxic factors, too, may play a part. Defective lacrimation renders the conjunctiva and cornea vulnerable to secondary infections. Corneal sensation and the blinking reflex are also impaired so that the normal transparency of the cornea is likely to be diminished. Intraocular pressure is lowered and varies inversely with the specific gravity of the blood. No vitreous or lenticular changes could be exclusively attributed to the acute stage of the disease but keratomalacia might set in if convalescence was unduly delayed by complications.

Epidemic Droser—BRADURI¹⁸ reports a case of papilloedema which occurred during an attack of epidemic droser. Both eyes were involved and haemorrhages had occurred in that most affected. Ocular tension was raised and the eye with the higher tension showed its swelling of the nerve. Central and peripheral vision was excellent in each eye but both blind spots were slightly enlarged.

The Egyptian Government's Twenty Second Annual Report of the Ophthalmic Hospital Section for 1934¹⁹ presents the usual valuable statistics and indicates the active interest taken by the authorities in the prevention and treatment of eye disease in that country. The figures show that 80 per cent. of the existing blindness is due to sore conjunctival trouble and that 39,478 cases of gonococcal conjunctivitis 21,758 of Koch-Weeks and 884149 of all forms of trachoma were treated during the year. Considerable attention is given to ophthalmic treatment in schools—it would appear that 98 per cent. of the scholars were trachomatous at the beginning of the year and about the same number at the end of the period—a fall in the number of the early cases being associated with an increase in that of the cicatrical. A chart demonstrates how closely the prevalence of eye disease rises and falls with the atmospheric temperature.

¹⁴ Amendola (Francisco). Considerações sobre o tratamento das complicações oculares na lepra.—Rev. Leprologia de São Paulo 1925. Num. especial pp 106-114. With 4 figs on 1 plate.

¹⁵ Braduri (B. N.). Ocular Complications in Cholera.—Cakruan 21st Jl. 1935 Oct. Vol. 30 No. 4 pp 219-224

¹⁶ Braduri (B. N.). Papilloedema in Epidemic Droser.—Cakruan 21st Jl. 1935 Aug. Vol. 30 No. 2, pp 91-94. With 4 figs. (2 coloured) & 2 plates.

¹⁷ Egypt: Ministry of the Interior. Department of Public Health. Ophthalmic Hospital Section. Twenty Second Annual Report of the Ophthalmic Hospital Section for 1934—45 pp. With 1 folding chart & 1 folding map 1935 Cairo. [P.T. 12]

As might be expected, the ninth Annual Report of the Giza Memorial Laboratory^{**} for the year 1934 covers much of the same ground as the above, but enters more fully into details and furnishes particulars regarding the pathological and clinical research undertaken during the year. Various interesting and excellently illustrated cases are recorded.

It is stated that smallpox is a very unusual cause of blindness in Egypt—a contrast to some tropical countries. The research department dealt largely with gonococcal ophthalmia and trachoma. Ophthalmia neonatorum is a very rare disease in Egypt and gonococcal ophthalmia, though so prevalent has no clinical or epidemiological connexion with gonococcal urethritis. Dr Ibrahim AHMED made a study of the biological character of the different strains of gonococci found in the conjunctival sac. The organisms were classified into three groups according to their antigenetic complexity—high, low and medium—the ophthalmic strains mostly belonged to the medium group with an inclination towards the high group. It is important to note that gonococci could always be found in the conjunctival epithelium at the time of the patient's discharge from hospital apparently cured. The Director Dr Rowland WILSON makes some interesting remarks regarding the Prowazek Halberstaedter body. Some observers consider that the elementary bodies which constitute the cell inclusion represent the actual virus of trachoma and that this virus is filterable. Human inoculations of bacteria free filtrate containing elementary bodies having given rise to experimental trachoma. Egyptian investigators however have failed to find the inclusion in cases of the disease not complicated by a secondary infection. He asks the pertinent question. Are we therefore dealing with two different diseases? The proprietary remedy Arohid was tried in the treatment of the disease and found not entirely satisfactory. F H STEWART found that there is still no clear proof that trachoma virus can pass gradocol membranes of *a.p.d.* 0·6-0·7 μ . WILSON & EL TOBGY discuss the influence of the endemic diseases on ocular troubles. Bilharzia appears to have little effect nor could any particular trouble be attributed to ankylostomiasis. Helminthiasis seemed however to be responsible for much of the xerotic infections. [But it must be remembered that helminthiasis and malnutrition are frequently associated.]

H Kirkpatrick

^{**} CAIRO Ninth Annual Report of the Giza Memorial Ophthalmic Laboratory 1934 [Wilson (Rowland P) Director]—150 pp With numerous illustrations. 1933 [23 P T]

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¹⁶ AMENDOLA (Francisco). Considerações sobre o tratamento das complicações oculares na lepra.—Rev. Leprologia do Sudeste Paranaense 1933. Núm. especial pp. 108-114. With 4 figs. on 1 plate.

¹⁷ BRADURI (B. N.). Ocular Complications in Cholera.—Calcutta Med. J. 1933 Oct. Vol. 30 No. 4. pp. 219-234.

¹⁸ BRADURI (B. N.). Papilloedema in Epidemic Dropsy.—Calcutta Med. J. 1933 Aug. Vol. 30. No. 2. pp. 91-94. With 4 figs. (2 coloured) on 2 plates.

¹⁹ EGYPT. Ministry of the Interior. Department of Public Health. Ophthalmic Hospitals Section. Twenty Second Annual Report of the Ophthalmic Hospitals Section, for 1934—45 pp. With 1 folding chart & 1 folding map 1935 Cairo [P.T. 12].

field unit and in the place selected among 172 houses and 982 persons examined 116 and 242 respectively were found infected or 67.4 and 24.6 per cent. The greatest house infection rate was 83.3 per cent. in Liuchuan and the highest in persons 31.5 per cent. in Chengchuan.

For Helminthological investigations antschistosomiasis units have been established in Kutang near Hangchow and Chil Hsien another to study the epidemiology of Paragonimiasis in Shaohing Chekiang and of Fasciolopsis infestation in Shanghai and of both the first and last in Chinkiang. The department has published a *Guide to the Laboratory Diagnosis of Human Helminths* (in Chinese).

Geographical Distribution of Certain Diseases Prevalent in China

Disease	Distribution
Amoebic Dysentery	More prevalent in Central and South China.
Ascariasis	Common throughout China.
Bacillary Dysentery	Endemic throughout China.
Beriberi	More prevalent in coastal provinces such as Kwangtung, Fukien and Chekiang.
Cestodes	Moderately prevalent in North China.
Cholera	Sometimes epidemic in coastal provinces and Yang Tze Valley (About 100 000 cases were reported in 1932. Only 7 sporadic cases were reported in 1933 and 6 in 1934)
Clostridium sίnensis	Prevalent in Kwangtung
Dengue Fever	Sporadic in South China.
Diphtheria	More common and more severe in North China.
Elephantiasis	Comparatively common in Kiangsu and Fukien.
Epidemic Meningitis	More prevalent in the Yang Tze Valley
Fascioloplasiasis (<i>F. buski</i>)	Endemic in Chekiang especially in Shaohing (Shaohsing)
Hookworm Disease	More common in Central China.
Leishmaniasis Donovani (Kala-azar)	Prevalent north of Yang Tze River especially in Shantung, North Kiangsu and North Anhwei.
Malaria	Prevalent in South and Central China rare in the North west.
Measles	Endemic throughout China.
Paragonimiasis Westermani	Sporadic in Coastal provinces.
Plague	Sporadic in Fukien reported epidemic in Shensi Shenxi and Suyuan in 1928-29 and in Shensi and Shenxi in 1931
Relapsing Fever (<i>S. recurrentis</i>)	More prevalent in North China.
Scarlet Fever	More common and more severe in North China.
Schistosomiasis	Prevalent in lower Yang Tze region.
Smallpox	More common in rural areas
Syphilis	Common in large cities.
Trachoma	Common throughout China.
Tuberculosis	Common throughout China.
Typhoid and Paratyphoid Fevers	Endemic throughout China.
Typhus Fever	Sporadic in South China endemic in North China.

other than those referred to above are included in the full account, but these remarks will suffice to show the activities of the Dakar School of Medicine.

H. H. S.

BLANCHARD. La formation des auxiliaires médicaux dans les colonies françaises. L'Ecole de Médecine de l'Afrique Occidentale Française à Dakar [Medical Assistance in the French Colonies. The Dakar School of Medicine.]—*Bull. Office Internat. d'Hyg. Publique* 1935 Aug Vol. 27 No. 8 pp. 1575-1592. With 4 figs. & 2 plates.

The Dakar school was opened at the end of 1918 and has afforded training for medical men, veterinarians, pharmacists, nurses and midwives. Its pupils are drawn from the Sudan, Senegal, Dahomey & Ivory Coast, Guiana, Sierra Leone, Nigeria, Togo, Liberia and Haïti Volta. The course is 4 years for medical students, 3 for pharmacists and midwives. There is a Director and Assistant Director nominated by the Governor General of French West Africa, with a Board of Professors. The article gives accounts of the curriculum, the clinical and other facilities, the examinations and the prospects of those who undergo training at the school. Illustrations are given of the buildings, the maternity section, the operating room and a laboratory which show the buildings to be handsome and substantial and the interior well equipped.

H. H. S.

FEDERATED MALAY STATES. Annual Report of the Institute for Medical Research for the Year 1933 [BLAERIN (P. H.) Acting Director]—143 pp. 1934 Kuala Lumpur F.M.S. Govt. Press.

This excellent report covers a wide range. The main subjects of research were malaria and tropical typhus, and except for a note to the effect that there were two cases of melioidosis—one in a man and one in a dog—these are the only sections of the report dealt with in the summary.

Malaria—Dr Richard Green continued his investigations into the use of atebrin. In the Annual Report for the previous year (*The Bulletin* 1934 Vol. 31 p. 728) he reported that in the treatment of hospital patients there were fewer relapses after a course of atebrin than after a course of quinine. He has now tried it on rubber estates, beginning with a mass treatment of the whole population and subsequently treating all cases of fever which occurred. The results were excellent during the whole period the working efficiency of the labourers was maintained at a high level. During the most malarious season only 2 per cent. of the available working days were lost owing to fever. The results of quinine treatment, as it is usually given on estates, were much less satisfactory. This is not attributed to the inferiority of quinine, but to the difficulty of giving it. Quinine costs only about a third of the price of atebrin, and if it were given in curative doses over short periods it might prove more satisfactory than atebrin. The usual practice on estates is the haphazard administration of quinine in sub-curative doses which have little effect. The estate dresser may wish to give more quinine but the labourers will not take it because it produces symptoms of cinchonism and interferes with their work. The poor results obtained among the quinine-treated group were regarded as no condemnation of quinine but rather as a demonstration of the wastefulness and

ineffectiveness of giving long-continued and interrupted courses of quinine in a dosage averaging about ten grains daily. The great advantage of atebrin is the willingness with which the labourer takes it. "The fact that the daily dose of atebrin can be given at one muster also the willingness of estate labourers to take atebrin without fear of cinchonism both assume an importance in obtaining efficient treatment. There are many difficulties in the way of drug control one is the continual change in the personnel of the labour force in certain circumstances the rate of change in the estate populations may be so rapid that whether atebrin or quinine is to be used would become a matter of indifference.

It can hardly be expected that the results of atebrin administered by the staff of an estate as a part of the ordinary routine will equal the results of treatment by experts during a special investigation. Much depends on the dresser in charge on most estates he has no microscope and cannot distinguish between malaria and fevers of non-malarial origin. During the course of this investigation it was found that only 58 per cent. of the cases of fever were due to malaria. Dr Green concluded that atebrin was the best drug available for giving mass or blanket treatments because quinine administered in curative doses gives rise to symptoms of cinchonism which render the labourers unfit for work but at no time, during any of the experiments with atebrin was justification found for reduction of the oiling programme just because mass treatments with atebrin were being given.

Dr Green has made a number of investigations into the relative avidity for human blood of the various Malayan species of anophelines when placed in feeding cages. The most avid was *A. maculatus* 71 per cent. of 2,638 took human blood *A. hyrcanus* var. *nigerrimus* came next with 57 *A. aconitus* 43 *A. philippinensis* and *A. hyrcanus* var. *sinensis* 37 *A. subpictus* 31 *A. barbirostris* 28 *A. sundaeicus* 21 per cent.

Attention is drawn to the difficulty of distinguishing the oocysts of *P. falciparum* and *P. vivax* from those of the monkey parasite *P. inui* at certain stages of development. The position has been further complicated by the finding of malarial parasites in other Malayan mammals the flying fox, the common squirrel and the house bat.

The Entomologist Mr E. P. Hodgson carried out special investigations on a rubber estate. He found that the maximum incidence of *A. maculatus* occurred at the end of March, with a secondary rise in September. The larval densities of *A. maculatus* and *A. kareni* were found to correspond closely with the adult densities contrary to the findings of workers in other parts of the country. Precipitin tests were made with blood from wild anophèles and the results showed that *A. maculatus* was predominantly anthropophilic 84 per cent. of this species contained human blood as compared with an average of 24 per cent. for other species. Two of these others *A. barbirostris* and *A. hyrcanus* appear to be facultative zoophiles they act as carriers in the towns where the population is dense and where there are few animals. An outbreak due to these mosquitoes is reported from a low lying district in the town of Batu Gajah where nearly 3 per cent. of the *A. barbirostris* were found to be infected. Experiments were made with Professor Williamson's silting method of control. This method consists of the construction of reservoirs in the course of a stream the object being to wash away the larvae at intervals by releasing the

dammed up water. The results were not successful, owing to the friable soil of the lowlands the flood gates were repeatedly washed away and the necessary alterations in the shape of the drains increased the number of breeding places. Many other interesting observations are recorded for example *A. deeri* and *A. swinhonis* (mosquitoes) were found breeding by the sea in pools with a salt content of about one-third that of sea water.

Tropical typhus and Japanese river fever—Dr. R. Lewthwaite and Dr S. R. Savoor continued their investigation into the viruses of tropical typhus and Japanese river fever. They have carried on the "Seerangayee" strain of the rural, scrub or "K" type of tropical typhus in guinea-pigs to the 58th generation and the "Manikam," urban, or "W" strain to the 46th. The Wellington "strain of Japanese river fever is now in its 54th generation in the eyes of rabbits. Cross-immunity tests were made with the three strains, using the intracardiac method in rabbits and the previous year's findings (in guinea-pigs) were confirmed, i.e., that while the viruses of scrub typhus and Japanese river fever are immunologically the same, there is no cross immunity between these viruses and that of the urban or "W" form of tropical typhus.

Unlike *Ixodes munnii* of Nicolle, the virus of the "K" type does not produce a well marked reaction in white rats. The "Seerangayee" or "K" strain has never produced a macroscopic scrotal swelling in guinea-pigs, or local rats, such as is produced by the "Manikam" or "W" strain. An attempt was made to immunize guinea-pigs against the "K" strain by the inoculation of formalinized brain passage virus, but no protection resulted.

Cross immunity tests with the virus of Rocky Mountain spotted fever and the viruses of the two types of tropical typhus showed that there was no cross immunity between them. The spotted fever virus was sent to the laboratory from Montana, U.S.A. in infected ticks. A difficulty was experienced in maintaining it in guinea-pig, it nearly always caused scrotal swelling. It was difficult to maintain in rabbits eyes it produced IgM not IgA agglutinins. In short, it was more nearly related to the urban or "W" strain of tropical typhus than to the rural or "K" strain.

II. Flecky

FEDERATED MALAY STATES. Annual Report of the Institute for Medical Research for the Year 1934 [KINCSURU] (A. Head)
Director — 107 pp. 1935 Kuala Lumpur Govt. Press.

Among items of special interest in this Report are —

- (1) Evidence that, in ordinary estate practice, a short course of quinine is as efficient as a course of atebrin and costs only a fifth of the price.
- (2) The importance of *A. berberastrus* as a carrier in the Malay States.
- (3) The demonstration that the intradermal inoculation of the virus of rural tropical typhus produces a primary lesion like that of Japanese river fever.
- (4) The proof that urban tropical typhus is carried by fleas.

Dr. Richard Green continued his work on the relative value of quinine and atebrin in the treatment of labourers on rubber estates. The theoretical advantages emphasized in his earlier reports would apply mainly to groups of labourers who were members of a stable population residing in an area where opportunities for re-infection

with malaria parasites were few. He has now investigated the use of atebrin on rubber estates under essentially practical conditions and has carried out a series of experiments in order to determine how the results of short curative courses of quinine 20 grains a day for one week compare with those of six-day courses of atebrin. He found that

the treatment of fever cases in the atebrin group cost about four times as much as the treatment of such cases in the quinine group. The general efficacy of treatment was found, however, to be similar in each group i.e. in the quinine group approximately the same results were obtained at about one-quarter of the cost. Atebrin is used to its best advantages when mass treatments consisting of curative doses are given for periods of 6 days to labourers on estates. These mass treatments are recommended once monthly during malarious seasons and every two months during comparatively non-malarious seasons.

Experiments made with the object of determining the shortest period within which anophèles are able to transmit malaria showed that most species fed readily two days after emergence from the pupa and that eight days later many of them were capable of transmitting malaria. The maximum duration of life in the laboratory of 14 different species of Malayan anophèles was from 36 to 66 days and the average life of most species was about one month.

Mr E. P. Hodgkin the entomologist continued the trapping of mosquitoes in human baited traps. In the Report for 1933 it was mentioned that *A. barbirostris* had been found responsible for an outbreak of malaria in the town of Batu Gajah and during 1934 it was found to be a carrier in the coastal districts.

Tropical Typhus and Japanese River Fever—Drs R. Lowthwaite and S. R. Savoor continued their work on these diseases. The following strains of virus are maintained in the laboratory.—

- 1 "Seerangayee" K. or rural tropical typhus 92nd generation in guinea-pigs
- 2 Manalkam W. or urban tropical typhus 84th generation in guinea-pigs
- 3 Raub (formerly Wellington) Japanese river fever 87th generation in rabbit's eyes
- 4 Kepong Japanese river fever established during the year

Drs Lowthwaite and Savoor have already demonstrated the identity of the viruses of rural typhus and Japanese river fever. The only difference between the two diseases is the absence of the initial ulcer in the first and its presence in the second. Experiments were made during 1934 to determine if the virus of rural tropical typhus would produce an initial ulcer resembling that seen in Japanese river fever if it were inoculated intradermally. For this purpose rabbits and monkeys were inoculated intradermally with the Seerangayee strain of rural typhus and also with the Raub strain of Japanese river fever. The results were the same in both cases—a papule appeared at the site of inoculation which became a small circumscribed ulcer with a black necrotic centre and a surrounding red areola—a leucopenia and a positive Weil Felix reaction (OVA being agglutinated) occurred in both cases. These experiments confirm the identity of the viruses and it is suggested that the difference between tropical typhus in which there is no initial ulcer and Japanese river fever in which an ulcer is the characteristic feature depends in nature on a difference in the route of inoculation of the virus—in one it may be subcutaneous and in the other intracutaneous.

dammed up water. The results were not successful, owing to the friable soil of the lowlands the flood gates were repeatedly washed away and the necessary alterations in the shape of the drains increased the number of breeding places. Many other interesting observations are recorded for example, *A. baeri* and *A. swinhonis* (fallow) were found breeding by the sea in pools with a salt content of about one-third that of sea water.

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Unlike *L. typhus muris* of Nicolle, the virus of the "K" type does not produce a well marked reaction in white rats. The "Seerangayee" or "K" strain has never produced a macroscopic scrotal swelling in guineapigs, or local rats, such as is produced by the "Manikam" or "W" strain. An attempt was made to immunize guineapigs against the "K" strain by the inoculation of formalinized brain passage virus, but no protection resulted.

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W. Fletcher

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Stoyle, the Government Analyst. The latter report, though of importance to the Island calls for little comment. During the year 19715 samples were dealt with a 16 per cent. increase on the return of the previous year. The work was of a routine nature comprising biochemical examinations for the Medical and Health Services medical-legal investigations analyses of milk and food and work for the Police, Customs, and Public Works departments.

The work at the Bacteriological Laboratory may be divided into (1) Routine (2) Research. The former includes Kahn tests Widal tests preparation of vaccines including the usual enterica group and human and bovine BCG bacterial analyses of public and private water samples, etc. altogether 9633 specimens were dealt with of which 2444 were pathological. Among the faecal specimens the commonest helminth ova found were those of *Trichuris trichiura* (593) those of hookworm next, but less than half (285) and ascaris third (246). The most frequent protozoal finding was *E histolytica* (47). Water samples totalled 448 fortnightly examinations were made of 6-10 samples of water from various parts of the Mare-aux Vacoas supply. The water is often turbid and odorous due to the filters becoming charged with *Beggatoca*.

Interesting cases of schistosomal salpingitis (*Sch haematobium*) are reported and one other particularly noteworthy. An Indian boy of 14 years was very heavily infested with *S haematobium* as many as 1,500-2,500 ova being found per cc. of urine. He had a sharp attack of malaria. *P falciparum* was seen in his blood and quinine sulphate 45 grains, was given for 3 days. The attack subsided and the ova of schistosomes practically disappeared prolonged search revealing only a few and these damaged and non-viable. It is conjectured that the cure of the schistosomiasis was due to the high fever (105°F) rather than to the quinine or that it was a mere coincidence.

Another interesting case was that of a man dying 12 hours after an operation for acute abdominal symptoms. At autopsy an Ascaris was observed protruding from a torn hepatic bile duct. 7 specimens were found in the gall-bladder and 10 in the liver bile ducts.

Attention should also be called to the recording of two further cases of spryus one an indigenous Creole.

Two important pieces of research were pursued (1) On the local intermediate host of *Sch haematobium* (2) On Trypanosome infection of stock.

As regards the former Incrimination of *Bulinus (Pyrgophyssus) forskali* is based on the following observations —

(i) *B (P) forskali* was the only snail of many species tested which exerted a definite attractive action on freshly hatched miracidia.

" (ii) The miracidia were actually seen vigorously to attack specimens of this species of snail.

(iii) Penetration was observed *in vivo* under experimental conditions

(iv) This was subsequently confirmed by fixation of snails after a short period of exposure to infestation and section when it was seen that enormous numbers of miracidia had gained entrance into their bodies

" (v) Developmental forms of the larval stages of the worms were readily found on dissection after about two weeks in every snail of this species exposed to infestation none were recovered from snails of other species

(vi) After a period of three weeks characteristic sporocysts were found in the liver glands containing bifid tailed cercariae true to type

"(vii) Within twenty-eight days from initial exposure to infection every snail so exposed was found on dissection to contain sporocysts with characteristic cercariae in large numbers and at the end of the period usually a large number of cercariae were being emitted naturally from the affected molluscs.

(viii) No other type of cercariae has so far been found in any snails dissected at the laboratory in spite of the fact that over hundreds have been dissected during the last ten years. Wild snails obtained from the canals which we utilise for our material have not so far been found naturally infected, although a specific search on a large scale for naturally infected snails has not yet been undertaken in places where there is a greater possibility of their acquiring the infection naturally.

During the early part of the year a survey of the distribution of *Bulinus forskahli* in the Plaines Wilhems was undertaken. The whole course of the river and its tributaries afforded specimens of the snail's diet small streams in the neighbourhood of Port Louis. It appears to prefer fairly swift running streams to still water hence attempts to keep them alive in tanks at the laboratory were not successful. Experimental work with guinea-pigs has also failed—perhaps the infective present was not sufficiently heavy.

As regards the second investigation—trypanosomiasis of cattle. This has been known for some time and preventive measures have included prohibition of importation of cattle from infected areas, quarantining of all imported stock for periods of observation, routine examination of the blood of cattle throughout the island, isolation and treatment of those found infected with surra and destruction of infected equines. For some years past occasional cases of trypanosomiasis have been noticed by planters among their horses and these animals survived and returned to work apparently in perfect health. These were probably cases of *T. evansi* infection a fact borne out by the laboratory findings this year in specimens from Pamplemousses, Quatre Bornes, Candos, Highlands, Curepipe and the Mabébourg area.

Formerly the trypanosome was believed to be *T. evansi* in each case but some have proved to be *T. vivax* so there are clearly two distinct infections in Mauritius—surra of Indian origin and a gana from Africa. Of 17 cases reported 12 were infections by *T. vivax* and 5 by *T. evansi*. The main points on which the diagnosis of *T. vivax* rests are—

(i) The trypanosomes were recovered from several locally-bred cattle which were not very obviously ill—they had been found to be infected on casual routine examination of the peripheral blood during the work of the veterinary section of the Agricultural Department.

(ii) These trypanosomes repeatedly and consistently failed to infect any one of a very large number of small laboratory animals, including dogs, white mice, guinea-pigs, rabbits and monkeys (*Macacus cynomolgus*) when injected in large numbers intraperitoneally. All these animals were found to be very susceptible to infection with the local strains of *T. evansi* which were invariably fatal to them.

(iii) The parasites, however, were readily inoculable into cattle and goats, where the resultant infections ran a prolonged course.

(iv) Morphologically and in their movements when alive, they conformed to the characters of the *vivax* group of African trypanosomes.

"(v) Clinically the type of infection resulting from experimental inoculation was quite unlike that produced by similar inoculation with the local *T. evansi*. Parasites were never present in the peripheral blood of experimentally-infected animals in very large numbers—they regularly disappeared entirely as judged by prolonged daily examinations of wet smears for days or even weeks at a time—the animals were, seemingly

not seriously incommoded by their infections after the first week or so following the inoculation when there was a certain degree of irregular fever and diarrhoea and in the case of at least two goats and two oxen, trypanosomes became regularly more difficult to find over a period of four or five months until finally they have not been recovered for over three months and the animals appear to have recovered from the infection entirely.

(vi) Full courses of arsenical medication repeated in some cases on two or three occasions entirely failed to eradicate infection with this type of trypanosome while similar courses have been efficacious in local *T. evansi* infections.

(vii) Opportunity for the introduction of some of the less virulent African trypanosomes into Mauritius must have been fairly frequent over a period of many years as South Africa is the usual source of pedigree and higher-grade stock for this island.

It is of fundamental importance to determine the distribution and method of spread of these infections economically as well as scientifically for the fact that one African trypanosome has been able to establish itself in the island in the absence of Glossina makes it possible that other African trypanosomes may have done the same.

During the year the following have been published by the Laboratory staff —

- ADAMS A. R. D & WEBB Lewis. (1934) A Survey of the Protozoal and Helminthic Infestation Rates of the Male Prison and Reformatory Inmates of Beau Bassin Prison Mauritius — *Ann Trop Med & Parasit* Vol 28 p 25
- ADAMS A. R. D (1934) Studies on Bilharzia in Mauritius I The Experimental Infection of *Bulinus (Pyrgophyse) forskali* with *Schistosoma haematobium* — *Ibid* Vol 28 p 195 H H S

KENYA COLONY AND PROTECTORATE Medical Research Laboratory Annual Report 1934 [CORMACK (R. P.) Senior Bacteriologist] — 29 pp 1935 Nairobi Govt. Printer

Approval has been obtained for the separation of the Government Analyst's Section from the Medical Research Laboratory to date from January 1st 1935. The Section will however still be housed in the Laboratory.

Routine work of the Bacteriological and Medical Biological Sections has been transferred very largely to the care of Laboratory Assistants, and the ordinary management of the Laboratory into the hands of a Laboratory Superintendent. Owing to an epidemic of smallpox of a virulent type early in the year heavy demands were made by the Medical Department for vaccine lymph. These were effectively met. The use of Dr de Smidt's pneumococcal vaccines on mines in the Kakamega district may afford an interesting comparison with similar work in South Africa. Of the local types of pneumococci which can be recognized among Group IV strains the three types most numerous among those reported have been the local D, L and J types which have been found to correspond with Miss Cooper's Types VIII, V and VII respectively. Of 190 cultures of Pneumococci typed 28.4 per cent. were found to belong to Type I, 7.9 to Type II and 9.5 per cent. to Type III. In the previous year the percentage of Type I was 17.2.

Note is made of antimalarial work carried out in eight specified areas with special mention of the Kakamega district. The work of trapping and of otherwise reducing tsetse flies in defined areas has been continued and is affording promising results. In co-operation with the

Veterinary Research Department Staff experiments have been initiated to investigate the possible transmission of bovine haemorrhagic septicaemia by the agency of fleas. The results of the first two experiments were suggestive of successful transmission to white mice through *Ctenocephalws felis strongylus* Jord. Further work is planned. Particular attention has been paid to rat destruction by "Cyanope" fumigation to be used by native labour in connection with the type endemic plague area of Keruguya. Tests of fumigation by "Cedopex" Units of steamers and trains have led to the recommendation of their adoption whilst preliminary trial of Cymag has afforded promising results with a view to a more economical fumigant for native bats.

A biochemical analysis was completed of a series of eighty-two vegetable foodstuffs and a series of milk samples, taken at fortnightly intervals throughout lactation of three native cows, were examined among other research of the Biochemical Section. P H Metha.

PALESTINE, DEPARTMENT OF HEALTH. ANNUAL REPORT FOR THE YEAR 1934 [Section VII. Laboratory Services pp. 86-108.]

There was a further marked increase in the number of routine investigations and in the production of biological products during the year. Bacteriological routine specimens increased by 40 per cent, to 200,000; the Chemical division showed a rapid expansion of the biochemical branch. Entomological activity has been limited since the abolition in 1931 of the post of Medical Entomologist and identification of insects has been carried out by ordinary laboratory officers.

It is noted that bacteriological and chemical institutes, maintained by private funds, have greatly increased in number in the principal cities and that such institutes have rendered considerable service.

Owing to extensive losses of vaccine lymph in 1933 increased production was called for in 1934 and this had to be unusually prolonged. A poor quality of calf made matters worse until a new lessor provided animals which gave an average yield of 59 grams of pulp compared with the earlier average of 30.3 grams.

Antirabic vaccine, a modification of Semple's, is made in the Central Laboratories, while treatment is decentralized. Thus over 90 per cent. of bitten persons were able to attend at 31 centres within a week of being bitten. Although there has only been a negligible response to the facilities offered by way of canine prophylactic vaccination, the course of which is three doses each of 2 cc. on successive days, a very large number of ownerless dogs and cats, and wild animals were destroyed. Greatly improved legislation for control is now provided by the Rabies Ordinance of 1934.

Further investigation has been carried out in the agglutinin response to antienterica vaccination. The results as already published suggest that freshly prepared vaccine without the addition of preservative is to be preferred. The Central Laboratories, at the request of the Colonial Office provided accommodation and gave assistance to a research worker in enterica serotherapy.

From 53 human specimens the human type of *M. tuberculosis* was isolated 9 times and bovine not at all. Five veterinary specimens out of eight yielded the bovine type.

Diphtheria in Palestine seems in the main to run a mild clinical course. "gravis," "mitis," and one "intermediate" strains have been isolated.

Further evidence has been accumulating that arachis oil (pressed locally from imported nuts) is the chief adulterant of and substitute for indigenous oils.

In a special investigation of the causes of the high acidity (3-5 per cent) of local unrectified olive oil which acidity restricts its foreign market it has been found that by avoiding fermentation prior to pressing local olives pressed in the laboratory can give an oil having less than 0.5 per cent acidity. Continuation of this work initiated by the Department of Agriculture is planned during the next olive harvest.

The Chemical Division has also been investigating the tolerance of citrus for salinity of irrigation water. A preliminary survey in the Jaffa area points to a tolerance up to 230 parts per million subject to good drainage while 250 to 350 parts would be considered risky and any higher figure would indicate danger to a projected plantation. Jordan water between the Lake of Tiberias and Jericho has shown a salinity of 300-400 parts per million which it derives from the Lake.

Further work is also in progress at the request of the Research Department Woolwich on the corrosion of aluminium alloys by Palestine water.

P H Martin

LHERISSON (Camille). Diseases of the Peasants of Haiti.—*Amer Jl Public Health* 1935 Aug Vol. 25 No. 8 pp 924-929 [22 refs.]

The Public Health Service in Haiti was organized in 1919 and has had to wage an uphill fight against heavy odds. Though much remains to do much has been accomplished and dispensaries have been established throughout the Republic. The prevalence of disease varies in different parts of the Island, clothing mode of living diet geographical situation, mountain or lowland district all exert an influence. Trauma is frequent among the peasants and the wounds becoming infected develop into extensive ulcers which not infrequently result in death from tetanus. The custom of children and young women carrying heavy loads leads to pelvic deformity and difficult labour and early resumption of work on the part of the mothers entails neglect and wrong feeding of the infants resulting in high infant mortality. Diarrhoea and dysentery are rife the amoebic form in the north and the bacillary fairly general an epidemic type known as colerim which affects annually about 25 per cent of the rural population being believed to be due to *Bact. dysenteriae* Flexner.

Ascaris hookworm (*Necator americanus*) *trichuris oxyurus* strongyloides and taenia are common among 4439 examined in the Carrefour Rivière Froide and Degand districts 30 per cent. were infested with *Necator* 43 with *Ascaris* and 58 per cent with *trichuris*. Neoplasms are unexpectedly frequent. Malignant tumours cause an approximate death rate of 5 per cent in the hospitals of the country. Goutre is common in the mountain districts and pinta in the plains. Tuberculosis is rife and rapidly fatal it is the most important cause of death in hospital, accounting for 30 per cent. of the total deaths.

Malaria is common tertian and double tertian are called acclimatization fevers. Among the 4439 persons examined in a Rockefeller Mission survey 67 per cent showed malaria parasites in their blood and of 11000 going from the north and north-east to work in Cuba for the United Fruit Company 23.5 per cent were infected. Leprosy is a menace and there being no leprosarium in Haiti, the patients remain

many of them, untreated and at large. Yaws is the commonest of all diseases among 2,564 persons examined by the Rockefeller Mission in the neighbourhood of Port-au-Prince 78 per cent. were infected, and among 3,289 cases of yaws 61.1 per cent. were children under 10 years and in the Jacmel region alone in the 12 months May 1925–April 1926, 167,287 cases of this disease were treated.

H H S.

SMITH (E. C.) Hodgkin's Disease in Natives of Nigeria. Results of the Biological Test.—*Lancet*. 1935. Oct. 19 pp. 874–877 With 4 figs.

This article is an account of a study of 9 cases of lymphadenoma met with in Africans in Nigeria. In three the tissues were sent without history to the author. Of the other six 5 were males aged 10, 14, 25 and 35 years [the age of the fifth is not given] and one an adult female. Three had general enlargement, one had cervical adenoma only, another cervical and axillary, another inguinal and deep abdominal. The duration of disease, where this could be ascertained, varied from 6 months to 3 years. A gland being removed was examined for histological changes for bacteriological associations and for Gordon's biological test in 3 cases. The histological changes were typical and are illustrated by photomicrographs. Bacterial investigations were undertaken to exclude infection with *Mycobacterium tuberculosis* and to determine whether diphtheroid organisms, as reported by BURRAGE and YAMA, were present. Guinea-pig inoculation yielded no evidence of tuberculosia. Anaerobic cultures led to the growth of the Bunting and Bates organism, *C. hagedorni* together with Gram-positive cocci and Gram-negative motile bacteria. The first of these was inoculated subcutaneously or intravenously into guinea-pigs, rabbits and monkey (*M. rhesus*) but with negative results (one monkey showed glandular enlargement, histologically a non-specific inflammatory reaction). In two of the three subjected to Gordon's biological test, typical positive results were obtained and the rabbits showed well-marked paralytic symptoms from the 4th to 7th day after inoculation. In the third case the result was doubtful. [In view of the presence of the disease among natives and, it would appear not very uncommonly if the author was able to study 9 cases, perhaps some of those with symptoms of relapsing fever in whom the spirochaete is not found may be instances of the Pal Elstein form of lymphadenoma.] H H S.

FRANCHINI (G.) Condizioni igienico-sanitarie delle nostre Colonie dell'A.O. [Sanitary Conditions in Italy's African Colonies].—*Reformae Med.* 1935. Sept. 21 Vol. 51 No. 38 pp. 1431–1439–1440

Very little is said in this article regarding the prevailing conditions of hygiene and sanitation in the Italian Colonies in East Africa. After a few remarks on the geography of them and on the natural waters which are not potable owing to the high saline content, the author passes on to give general advice on rendering water potable, on the questions of food, clothing, dwelling-houses and personal hygiene and the avoidance of disease. The terminal paragraphs are occupied with a list of the diseases which may be met with notably malaria, leprosy, ankylostomiasis, schistosomiasis, relapsing fever, yaws, and various mycotic infections.

H H S.

LEDENTU (G) Les maladies transmissibles observées dans les colonies françaises et territoires sous mandat pendant l'année 1933 [Transmissible Diseases in the French Colonies and Mandated Territories in 1933]—*Ann de Med et de Pharm Colon* 1935 July-Aug-Sept. Vol 33 No 3. pp. 552-816

Attention is drawn to this report which cannot be abstracted. It is analogous to though on a smaller scale the Supplement of the *Tropical Diseases Bulletin*. Whereas in the latter the medical and sanitary reports of each of the British Colonies Dependencies and Protectorates is abstracted and the advances in sanitation the prevalence of disease measures to combat them and research work are detailed in the former the diseases are taken up seriatim and their prevalence in different colonies etc. recorded. They are divided into four main groups (1) Infections such as plague cholera yellow fever smallpox and typhus (2) Endemo-epidemic such as malaria trypanosomiasis, the dysenteries relapsing fever dengue filariasis yaws beriberi etc. (3) Infections common to temperate and tropical climates—pneumonia influenza cerebrospinal fever enteric fever scarlet fever diphtheria chickenpox mumps rabies etc. including also trachoma and (4) Social diseases—tuberculosis venereal diseases leprosy alcoholism and cancer The whole will be useful for reference and comparison.

H H S

UCHIMURA (Y) "Imu a Malady of the Ainu.—*Lancet* 1935 June 1 pp 1272-1273

This description of imu would serve equally well for a description of the malady known as latah in Malaya.

In the condition known as imu the patient is liable to psychomotor attacks which are precipitated by some emotional shock such as a sudden unexpected sound or the mention of something which is regarded with horror such as a snake or a toad. The condition is almost entirely restricted to women who have passed middle age and who appear to be rather above the average in intelligence. Sometimes an attack consists of a sudden outburst of violence in a woman who up to that moment appeared quite normal she behaves as if possessed by rage and terror attacking everything in sight with hands sticks stones and weapons. The attack lasts only a few minutes and then the patient becomes normal again. In a less violent form when the patient is startled by some word sight or noise she may appear suddenly bemused and will continue for a time to echo everything that is said to her One you say to her and one the patient echoes you fool and you fool is the answer bow and she returns bow wow

Similarly actions are copied clapping the hands raising the arms all elicit similar acts on the part of the patient. When in this bemused condition patients are highly susceptible to suggestion and if placed in a given position will remain cataleptically in that exact posture until released by permission. If ordered to strike a given person, that person will be relentlessly pursued until the blow has been given to plunge into freezing water in the depth of winter or to bathe in boiling water offers no deterrent. In some patients the negative aspect of these three forms of reaction appears equally clearly Instead of repeating what is said to them they answer with a direct opposite instead of imitating movements they make out the significance of which is exactly the reverse instead of obeying suggestions they act in a directly contrary

manner. Similar maladies are to be found amongst the natives of Malay, the Laksuts of Siberia, and the American Indians, other races whose cultural level is recognized as being lower than that of the average.

The spiritual life of the Afuu people is very primitive and, as with all such races their degree of suggestibility is high. The women are by custom completely subservient to the men. The author regards both hysteria and imu as being due to repressed resentment and the resentment which activates the imu patient as being occasioned by the subordinate place to which she is relegated by Afuu tradition. The word imu means severe shock. The condition itself is generally called imu fitchi or "imu bakko" each of these suffuses merely old woman. Sometimes it is called tokoni-bakko tokoni being the native name of a dreaded viper the mere mention of whose name brings on an attack.

W. Fidler

BROWN (Arthur A. Forbes) The Ulcer Syndrome in Tropical Africa—
Jl Trop Med & Hyg 1935. Vol. 39. July 1-15 Aug 1-15
 Sept. 2 pp. 157-161 170-176 187-193 201-206 215-221
 [43 refs.]

This is a very good article clearly the outcome of much careful study. The author allocates ulcers to three main groups, but the grouping is an arbitrary plan (or want of plan) for the grouping is not a classification. Group A includes ulcers resulting from trauma scabies, etc., and spirochaetal such as yaws. Group B is the phagedenic (or phagoedemic throughout the article). Group C comprises ulcers clinically identical with Group B but resulting from trauma and later becoming phagedenic. This, it will be seen is not a grouping, since any ulcer may become phagedenic.

The bacteriological aspect is dealt with and analyses made of over 400 cases. Almost 9 out of 10 of the ulcers with *B. furiferous* are phagedenic whether associated with spirilla or not. The question of sex and tribal incidence is next discussed and then the coexistence of parasitic affections, malarial, or helminthic. Treatment is considered in some detail and results of careful blood analyses as regards serum G and P are tabulated. About one-third of those with phagedenic ulcers have a low Ca level and the beneficial effect of administration of calcium and parathyroid is noted. Diet is a subject which cannot be ignored in connexion with the aetiology of ulcers in tropical countries and due prominence is given to it here more than half the article being devoted to this side of the subject. The following are the author's conclusions —

(1) The exact relationship of *Bacillus furiferous* and *Spirillum tropicum* remains unproved, but the evidence suggests that these organisms are causal.

(2) Ulcer is a class disease, and is not found among the better classes or in institutions.

(3) Ulcer seems to be closely related to calcium and/or parathyroid deficiency and may be a manifestation of latent tetany.

(4) The calcium deficiency does not appear to be in the diet, but seems to be due to the diet, faulty absorption probably being a factor.

(5) The exact connection of the parathyroid with the condition is not clear, but the gland appears to have factors controlling calcium regulation and skin vitality and resistance, and it may be affected by dietary deficiency.

(7) One of the most important considerations is the quality of the protein in the diet. Ulcers are much more common in vegetarians than in those who include animal substance in their diet. It is essential that a fair proportion of the protein should be of animal origin as even nuts and beans have the disadvantage of being covered with resistant fibre.

(8) The vegetarian diet as consumed by the African native is much too bulky. Digestion of protein, fat and calcium may be greatly interfered with. The most important prophylactic measure which would go far to prevent the appearance of the ulcer syndrome is to include meat, eggs, fish or fowl in the diet, and to reduce the amount of vegetable matter. The consumption of three smaller meals instead of two larger would favour optimal utilization.

This article would form an excellent basis for a monograph on the nature causation pathology and treatment of ulcers in the tropics [not a 'syndrome' which means a set of concurrent symptoms in disease.]

H H S

FAIRLEY (N. Hamilton) & MACKIE (F. P.) Case of Streptothrixal Ulceration of the Colon with Portal and Systemic Pyaemia.—*Trans Roy Soc Trop Med & Hyg* 1935 July 31 Vol 29 No 2. pp 151-156 With 3 figs. on 1 plate & 1 chart.

This is an account of a case of actinomycosis in a man of 60 who had returned to England, after a long residence in China about two months before the onset of his illness.

The disease apparently originated in the colon but became generalized and ended fatally after 94 days. The clinical features suggested liver abscess but an exploratory operation failed to reveal any pus. About six weeks after this operation an abscess appeared in the left forearm and from the pus of this a streptothrix was cultivated. Five days later a superficial abscess on the right leg was opened and the pus from this also yielded a streptothrix. Three days later the patient died.

The macroscopic and microscopic appearances of the tissues post mortem, are described and a brief account is given of the fungus which was feebly Gram positive not acid fast and presented the general morphological characters of Actinomyces. It grew aerobically, did not liquefy gelatine and caused no change in lactose, glucose, mannite dulcite sucrose maltose raffinose, galactose. Rabbits, guinea-pigs and white mice inoculated by the subcutaneous, intraperitoneal or intravenous routes remained healthy and the fungus was not recovered from their viscera. The Actinomyces is thought to belong to Group I of Grskov's classification.

J T Duncan

Niño (Flavio L.) Blastomicosis humana generalizada por Cryptococcus (n. sp) (Estudio clínico parasitológico anatomo-patológico y experimental. [Generalized Human Blastomycosis caused by a New Species of Cryptococcus].—Universidad Buenos Aires Misión de Estudios de Patología Regional Argentina Jujuy 1934 Monografía No 3 164 pp With 129 figs. 13 plates & 7 charts. [110 refs.]

This could probably claim to be one of the most detailed records of a single case in the literature. The monograph gives an account of the clinical state of a man of 60 years who died from an infection with cryptococcus and of the investigations connected therewith. The

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J T Duncan

NICO (Flavio L.) Blastomicosis humana generalizada por *Cryptococcus* (n. sp.) (Estudio clínico parasitológico anatomo-patológico y experimental. [Generalized Human Blastomycosis caused by a New Species of *Cryptococcus*.]—Universidad Buenos Aires Misión de Estudios de Patología Regional Argentina Jujuy 1934 Monografía No 3. 184 pp With 129 figs. 13 plates & 7 charts. [110 refs.]

This could probably claim to be one of the most detailed records of a single case in the literature. The monograph gives an account of the clinical state of a man of 60 years who died from an infection with cryptococcus, and of the investigations connected therewith. The

patient had suffered for 14 years with an ulcerated condition of the hip with scab-formation. About a month before death similar lesions developed on the back. He had shown evidence of urinary disturbance—abscess of the prostate and blastomycotic involvement also of the renal pelvis were found to account for this. Diarrhoea was present due to gastritis of blastomycotic origin it was supposed, and, besides meningal symptoms and, post mortem oedematous infiltration of the brain was found, and in the right cerebral hemisphere deep down near the lenticular nucleus, a softened mass the size of a 5 centavo piece. The lungs were also involved—there was pus in the bronchioles of the right lung and a cavity in the left.

The author describes the fungus isolated from the lesions and experimental work carried out with cultures of it. It proved to be a Basidiomycete of the genus *Cryptococcus*, but of a species not previously described and the author has named it *C. psychrophilum* "on account of its most striking biological characteristic of growing at low temperatures only (psychro- = cold). Growth was best at 22-25°C., was good at 10°C. but arrested at 37°C. Guinea-pigs, white rats and mice were very susceptible to experimental inoculation and presented lesions similar to those in the human case—the dog and rabbit were less susceptible, while the monkey, cat and pigeon were refractory. In susceptible animals the course of disease was slow but invariably led to death. Histologically there were produced granulomata with abscesses; giant-cell formation and at the same time histolysis with necrosis and abscess. Dissemination occurred probably by the blood stream. The value of the work is much enhanced by the large number (25) photographs and photomicrographs depicting the histological changes set up and by 13 beautifully reproduced coloured plates. H. H. S.

MACKINNON (J. E.) Estudio del primer caso uruguayo de cromoblastomicosis y revisión crítica sobre la enfermedad. [A Study of the First Uruguayan Case of Chromoblastomycosis and a Critical Review of the Disease.]—Arch. Uruguayol. 1935, Vol. 2, pp. 201-226. With 8 figs. [Summarized in Rev. Tropical Urology 1935, Aug. Vol. 14 Pt. 8, p. 509.]

Clinical, morphological and cultural details are given of the first Uruguayan case of chromoblastomycosis due to *Pithophorus terebrans* a white native of the country. The lesions on the patient's right hip resembled those of sporotrichosis from a histopathological point of view. The disorder described by Montpellier and Catanet from North Africa is due to *Hormodendrum algens* is considered to be a form of chromoblastomycosis, which may also be induced by *Trichosporon johorensis*. So far the known distribution of chromoblastomycosis is as follows: twenty-one cases in Brazil and one each in Paraguay and Porto Rico (*T. pedrosoi*); two in the United States and the present one in Uruguay (*P. terebrans*) and one in North Africa (*H. algens*). The disease has further been reported from Costa Rica, Russia, and East Africa (one case each) but without any definite attribution."

CARRIÓN (A. L.) & ENRIKES (C. W.) A Spore Form Committee to THE Etiologic Agents of Chromoblastomycosis.—Puerto Rico Jl. Pub. Health & Trop. Med. 1935 Sept. Vol. 11 No. 1 pp. 114-115 [Spanish version pp. 116-117]

Three fungi giving characteristically different growths on culture are known to cause blastomycoses viz. *Pithophorus terebrans* which

small egg-shaped spores are budded out successively in the cup-like mouth of a flask shaped conidiophore *Hormodendrum pedrosoi* with larger oval spores in branching conidial chains on simple or branched conidiophores and *H compactum* with subpherical spores separated by wide septa borne in branching conidial chains on simple or branched conidiophores.

In the tissues however these differences are not distinguishable and on account of this fact a close interrelationship has been suspected. The authors have recently examined 6 strains of the second of those mentioned (*H pedrosoi*) 4 Porto Rican and 2 South American and one strain of *H compactum* and found spores of the Phialophora type though in smaller numbers than the characteristic forms. The discovery of a spore form common to all three affords further evidence of the hitherto suspected relationship. A paper with more detail is to be published.

H H S

MARTIN (Donald S) Complement-Fixation in Blastomycosis—*Jl Infec Dis* 1935 Nov-Dec. Vol. 57 No 3 pp 291-295

The antigen used for the C.F. test was a suspension in salt solution of the organisms grown at 37°C on beef infusion pH 7.4 blood agar slants. The patient's serum was inactivated at 56°C. for 15 minutes and the test carried out as for the W.R. Five strains of Blastomycetes isolated from the same number of patients were used. In three patients with generalized infection the test was positive in one negative. Sera from 78 others put up as controls were all negative and two of the sera positive for Blastomycetes were negative for Sporotrichum Monilia Coccidioides Mycoderma and Histoplasma. No correlation was observed between the presence of complement fixing antibodies and the patient's clinical state. It is concluded that the test is of great positive value a positive with a 1-4 dilution of the patient's serum is diagnostic but a negative test does not exclude infection with Blastomycetes.

H H S

KITABATAKE (E) & LIU (K. P) A Case of Pneumomycosis aspergillosis.—*Jl Oriental Med* 1935 Vol. 22 No 3 [In Japanese pp 497-505 With 1 plate English summary p. 43] [Summarized in *Rev Applied Mycology* 1935 Aug Vol. 14 Pt 8 p 510]

An undetermined species of *Aspergillus* was found to be responsible for necrosis of the lung parenchyma in a 23-year old male native of Manchukuo this being apparently the first record of pneumomycosis in the region under observation or in Japan.

CARRILLARI (Aldo) & STANDRINO (Thomas) A Case of Bronchomycosis due to *Monilia tropicalis*—*Jl Trop Med & Hyg* 1935 Oct. 1 Vol. 38 No 19 pp 244-245

MARQUE (E) & RAYNAL (J) Méliosidose à forme septique suraigüe. [Hyperacute Septicemic Melioidosis].—*Bull Soc Méd-Chirurg Indochine* 1935 Nov Vol. 13 No 9 pp 1259-1263.

A remarkable and unusual case. A woman of 48 years was taking her two daughters who were suffering from typhoid fever in a motor car to

patient had suffered for 14 years with an ulcerated condition of the face with scab-formation. About a month before death similar lesions developed on the back. He had shown evidence of urinary disturbance—abscesses of the prostate and blastomycotic involvement showed the renal pelvis were found to account for this. Dyspepsia was present due to gastritis of blastomycotic origin it was supposed, and, bitterly meningal symptoms and, post-mortem oedematous infiltration of the brain was found and in the right cerebral hemisphere, deep down near the lenticular nucleus, a softened mass the size of a 5 centavo piece. The lungs were also involved—there was pus in the bronchioles of the right lung and a cavity in the left.

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MAGGIOVON (J. E.) Estudio del primer caso uruguayo de crizoblastomicosis y revisión crítica sobre la enfermedad. [A Study of the First Uruguayan Case of Chromoblastomycosis and a Critical Review of the Disease].—Arch. Uruguayos de Medicina Vol. 2, pp. 201-228. With 8 figs. [Summarized in Rev. of Tropical Medicine 1935, Aug. Vol. 14 Pt. 8, p. 509.]

Clinical morphological, and cultural details are given of the first Uruguayan case of chromoblastomycosis due to *Phialophora verrucosa* a white native of the country. The lesions on the patient's right hand resembled those of sporotrichosis from a histopathological point of view. The disorder described by Montpellier and Catinat from North Africa due to *Hormodendrum algiricum* is considered to be a form of chromoblastomycosis, which may also be induced by *Trichosporon cutaneum*. So far the known distribution of chromoblastomycosis is as follows: twenty-one cases in Brazil and one each in Paraguay and Porto Rico (*T. cutaneum*); two in the United States and the present one in Uruguay (*P. verrucosa*) and one in North Africa (*H. algiricum*). The disease has further been reported from Costa Rica, Russia, and East Africa (7 cases each) but without any definite attribution."

CARRIÓN (A. L.) & ESCOBAR (C. W.). A Spore Form Common to Two Etiologic Agents of Chromoblastomycosis.—Puerto Rico Jl. of Public Health & Trop. Med. 1935, Sept., Vol. 11 No. 1 pp. 114-115 [Spanish version pp. 116-117]

Three fungi giving characteristically different growths on culture are known to cause blastomycosis, viz., *Phialophora verrucosa* which

buttock. From the pus *Pf whitmors* was grown and intraperitoneal inoculation into guineapigs caused death and from the organs the bacterium was again recovered.

This is said to be the fourth case recorded in the Dutch East Indies [see this *Bulletin* 1934 Vol. 31 p 344] H H S

- i. CASTELLANI (Aldo) A Note on a Peculiar Febrile Hepato-Splenomegaly with Arthritis.—*Jl Trop Med & Hyg* 1935 Sept 16. Vol 38 No 18. pp 229-230 With 1 chart
- ii. —— The Diagnosis of Hepato-Splenomegalies —*Ibid* pp 230-232.

i. The disease described is characterized by gradual onset of malaise and joint pains with asthenia. The temperature is raised, of an irregularly intermittent or remittent type or with a chart resembling that of undulant fever rigors are not usual. The spleen and liver are both hard and enlarged, extending even to the level of the umbilicus [which is the first to enlarge is not stated perhaps cases have not been seen early enough for this to be determined]. There is no jaundice. One or more joints large or small are swollen and painful but not as a rule reddened. There are no special blood changes no enlargement of lymph nodes. Though there may be periods of amelioration the course is progressive one patient died after an illness of 14 months.

The causation is at present unknown investigations so far have yielded entirely negative results Wassermann and Widal tests against the enterica and Brucella groups all negative. No treatment appears to affect the course of the disease.

The author has seen three cases perhaps more will be met with now that attention has been drawn to it for its distribution if sparse is widespread two were seen in South Europe and one in America.

ii. This article mentions the various conditions in which great enlargement of liver and spleen occur. They are divided into two main groups those with fever (20 in number) and those without (17 more) and the chief characteristic points of each are briefly referred to

H H S

- i. MANUWA (S L A.) Notes on Some Cases of Interest.—*West African Med Jl* 1935 Jan. Vol. 8. No 3 pp 15-17 With 7 figs. on 4 plates.
- ii. —— Lymphostatic Verrucosis.—*Trans Roy Soc Trop Med & Hyg* 1935 Nov 25 Vol. 29 No 3 pp 289-290 With 2 figs. on 1 plate.

Of the four cases recorded in (i) attention may be directed to two as of particular interest. One was a case of Lymphostatic verrucosis a condition bearing superficial resemblance to Moasy Foot, the description of which is enhanced by two excellent illustrations [see also this *Bulletin* 1935 Vol. 32, p 182]. This case is also described in (ii). The other was a case of Porocephalosis. Human infection with Porocephalus is not so uncommon as the author states but its pathogenicity has been doubted. The subject in this instance was an Ibo male, about 30 years old who was suddenly attacked with vomiting abdominal pain and distension. He died four hours later and the acuteness of the symptoms and the rapidly fatal issue were somewhat naturally ascribed to poisoning of some kind. At autopsy some 20 or more nymphs of

hospital. An accident occurred and the car was thrown down embankment into a pond. The woman was rescued after submerging for a certain time and taken to hospital [the fate of the driver is not mentioned]. There she was found to have contusion of both legs, bruises of the chest and signs of water in the lungs. Pulse was barely perceptible and she was expectorating blood and stained froth. Next day she lay in a state of coma vigil, but though there was some respiratory difficulty there was no further haemoptysis. Dulness was present at the base and some moist rales. The day after she regained consciousness and seemed much better but within 24 hours the temperature rose to 39.8°C., the lung signs were better on the right, aggravated in the left and there was headache and rapid pulse (135 per minute). Thirty-six hours later the temperature was 40.7°C. pulse 140 and there was insomnia with continuous delusions. Next day the general condition was worse, temperature rose further, the pulse became uncountable. A sample of blood was taken for culture and sent to the Pasteur Institute and death occurred 8 days after admission to hospital. Autopsy was not performed, but report came from the laboratory that *Pf. whitmorei* had been identified from the culture.

The important question was the source of infection. One possibility was that the patient was already infected before the accident occurred so that the immersion and pulmonary complication had precipitated the illness (but except for high arterial tension and some doubtless from otosclerosis she was in good health prior to the accident). The other possibility was that the immersion and swallowing of water polluted by rats had been the cause—rats have been incriminated as a reservoir of this organism.

H. H. S.

VAUCEL (M.) & FLASLE (G.). Un cas de septicémie à bactérie de Whitmore. [Septicæmia due to *Pf. whitmorei*].—Bull. Soc. Médec. Chirurg. Indochine 1935. Nov. Vol. 13. No. 8. pp. 125-1258.

A soldier of the Tonking tirailleurs was admitted to hospital complaining of headache and generalized pain and giving a history of a "ts" fever. His face was congested and breathing dyspnoeic, and tracheal disseminated rhonchi and basal rales. The liver was slightly enlarged, not painful. Six days later jaundice was observed, the urine resembling those about 40°C. and a blood culture was attempted. Blood due to *Hansen's* adenom. The haemoculture gave a growth of *Pf. whitmorei*, formed by animal inoculation. At autopsy the child twenty-one carabous as large as a pigeon's egg at the lower pole of the liver (*T. foedoro*) and small military abscesses in a corresponding seroma (*P. seroma*). Spleen and liver were congested and a little enlarged. No further examination and "small superficial iridescent patches" in each case each) but without viscera showed little. The source whence infected was not discovered.

H. H. S.

CARRIÓN (A. L.) & EL. Etiologic Agents of dengue on Celebes. [Métaux dans la Dengue.—Health & Trop. Mar. et Afr. Ind. 1935 Sept. 3. Vol. 15. 115 [Spanish version], English summary (2 lines)].

Three fungi giving charwoman of 25 years came under the care of and are known to cause blastomycosis from a fistulous abscess of the right

The fish have a long tubular proboscis which can be protruded beyond the shell and opening into it is a sac containing two rows of hollow teeth. These penetrate the hand for example and the poison which is at the base of the teeth is injected into the bite. The symptoms after the initial prick are acute pain, swelling, local numbness and spreading paralysis. Speech becomes thick and indistinct the sight is dim and a sensation of pins and needles extends all over the body. Sore eyes is a troublesome symptom and may be the last to clear. There may be early drowsiness deepening to coma and death.

The natives know of the danger of these bites and make small incisions round the site to cause free blood flow. *H H S*

TALUKDER (M.) A Case of Aconite Poisoning treated by Hypertonic Saline by the Intravenous Route.—*Indian Med. Gaz.* 1835 Nov Vol 70 No 11 p 628.

Poisoning by aconite is not uncommon in India and this case is recorded because of the recovery which followed an unusual form of treatment after all the usual methods had failed and the patient appeared to be *in extremis*.

The patient by mistake swallowed about an ounce of A B C liniment (aconite, belladonna and chloroform and lin aconiti contains 0.2 per cent. alkaloid). The stomach was washed out with solution of potassium permanganate as soon as possible but all the symptoms of poisoning by aconite appeared and were so severe as to mask those of belladonna or chloroform. In spite of a second lavage the pulse became increasingly rapid weaker and irregular there was marked collapse with restlessness profuse perspiration and frequent diarrhoea. Although camphor ether strychnine digitalin and other stimulants and restoratives were given the patient's condition was becoming rapidly worse respiration failed on four occasions and was restored only by artificial means. Dr Talukder on account of the dehydration resulting from the sweating and diarrhoea thought intravenous administration of hypertonic saline might be worth a trial. Three pints [strength not stated] were given and improvement was surprisingly rapid. All the symptoms abated and recovery was complete in 72 hours.

H H S

McGEORGE (Murray) Haematological Variations in Fifty Normal Adult Males.—*Jl Path & Bact.* 1935. Jan. Vol 42. No 1 pp 67-73. With 4 charts. [16 refs.]

In recent months there has been considerable impulse in haematological investigations. Whereas much work has been done for many years on the blood changes in disease attempts are now being made to establish the limits of the normal in different parts of the world, in different sexes at different ages and of persons engaged in various occupations [*Ibid.* pp. 75-9].

The author has set out to determine the absolute figures for corpuscular volume haemoglobin and corpuscular haemoglobin concentration in 50 London medical students all believed to be in normal health. Blood was taken by venepuncture and 5 cc. placed at once in a small test tube containing 4 mgm. of potassium oxalate and 6 mgm. of ammonium oxalate both in solid form, for in this concentration cell leakage does not occur on centrifugation. Haemoglobin was

Porocephalus were found in the radicles of the hepatic vein, others were attached to the mesentery. *Schistosoma haemobium* was present in the bladder the spleen was fibrotic. Snake-eating is common in the district.

H H S.

JOURNAL OF THE ROYAL ARMY MEDICAL CORPS. 1933. Nov Vol 63 No. 5 Facing p. 324 The Haemorrhagic Syndrome.

This is an editorial giving in the form of a table the distinctive points of the morbid conditions associated with haemorrhage. Many practitioners, in fact we may confess without shame that at some time or other even late in our medical career we all have found difficulty in distinguishing purpura simplex from Schönlein's or Henoch's purpura or from the numerous symptomatic purpuras. In this table, they are divided into two main groups of primary diatheses and secondary or symptomatic purpuras the former again subdivided into haemorrhagic (purpura simplex and essential thrombopenia or Werlhof's disease) allergic (Schönlein's and Henoch's types of purpura) and "haemophilic" (haemophilia and haemogenia) and under each the patients are given as regards characters of exudate the cells of the blood, the coagulation time and bleeding time the age and sex of patient, the treatment and prognosis. In truth, a very present help in time of trouble.

H H S.

MACIAS Y MACIAS (Francisco). Otro caso de otomiasis por *W. fahrtsia magnifica* (Schiner 1882) [Otomiasis due to *W. fahrtsia magnifica*.]—*Medicina Peñes Celdas*. Madrid. 1933. Nov Vol 8. No. 11 pp. 538-541 [11 refs.] French summary (4 lines)

W. magnifica usually deposits its larvae in decomposing animal matter but not infrequently on ulcers and infected wounds and in the natural orifices of man and animals—in man the nose, ear and mouth and on the eyes. The diptera lives in the open and hardly ever enters dwellings. The case here recorded is that of a backward child of six years with a discharge from one ear. There had been a little pain in the ear but this became suddenly intensified and prevented all sleep. Examination discovered larvae (three were extracted) which proved to be those of *W. magnifica*.

H H S.

ALLAN (Joyce). Poisonous Shellfish.—*Med Jl Australia*. 1933. Oct. 19 22nd Year Vol. 2 No. 16 pp. 554-555. 11 figs.

The subject of this interesting paper is poisoning resulting from the bite of certain shellfish. The text of the discourse is a case which was reported from Queensland, the patient being bitten at Hayman Island and dying before reaching hospital on the mainland. Such cases are not uncommon in the South Pacific Islands, in New Guinea, the New Hebrides, New Caledonia, Tonga, Samoa, Fiji, New Britain, the Caroline Islands, the Society, Sandwich, and Loyalty Islands. The shellfish are *Conus* species, with brightly coloured shells. Five at least are known: *Conus tulipa*, *C. marmoratus*, *C. geographus*, *C. textile* (? *tessellatus*) and *C. sulcatus*.

quart spectograph with Spekka photometer on the blood of forty two subjects whose blood varied in haemoglobin concentration from 20 to 120 per cent. of the normal value.

For details of the apparatus and method the original paper should be consulted
N Hamilton Fairley

HARVEY (W F) & HAMILTON (T D). Studies in Method and Standardisation of Blood Examination. II. Sedimentation Rate and Sedimentation Volume of Blood.—*Edinburgh Med Jl* 1936 Jan Vol 43 No 1 pp 29-46 With 8 figs. (3 on 1 plate) & 2 graphs. [18 refs.]

In this paper the authors describe a capillary tube technique for determining the sedimentation rate and sedimentation volume of blood which is stated to be both dependable and easy to carry out and repeat. A capillary method had already been described by M Sweeney but as the authors point out the present technique differs in certain details

N Hamilton Fairley

DHAR (Jyoti) Haematological Studies in Indian Women (Part Four) A Preliminary Report on the Determination of the Schilling Haemogram (Differential Leucocyte Count) in Eighty-Six Normal Bengali Women.—*Calcutta Med Jl* 1935 Dec Vol 30 No 6 pp 333-366 With 5 figs [50 refs]

Dr Dhar has continued his haematological studies and the present gives an analysis of the results of examining the leucocyte formula of 86 normal Bengali women. He discusses Arneth's classification and is fully cognizant of the difficulties due to personal differences in interpretation of what constitutes separate lobes of the nucleus. He therefore considers the modifications of PAPPENHEIM and of COOKE and POWDER, the weighted mean of the latter authors the index of BUSHNELL and TREUHOLZ and that of HEUSON. He then defines the characters of the various white cells in order that there may be no confusion regarding his meaning and records his findings in accordance with the haemogram of SCHILLING. The women were between 16 and 30 years and so far as was known healthy. Of course 86 is a very small number on which to base standards but the figures obtained form a guide for more extensive researches. He found the following averages in percentages the range is given in brackets after each Basophile 0.1 (1-2) eosinophile 3.2 (1-12) myelocyte 0.01 (only one was seen in all) juvenile forms were absent in 21 of the subjects the average was 1.4 (1-4) staff forms 9.8 (2-18) segment 53.5 (40-73) lymphocytes 30.3 (17-42) and large mononuclears 1.5 (1-6)

H H S

JUSTER (Irving R.) The Normal Range of the Leucocyte Count determined weekly over an Extended Period.—*Jl Lab & Clin Med* 1936 Jan Vol 21 No 4 pp 376-380 With 3 charts

Before starting an investigation into the leucocytic changes qualitatively and quantitatively occurring in disease the author wisely undertook a study of 11 persons believed to be in normal health making a total leucocyte count weekly on the same day and at the same hour. Their ages ranged between 17 and 50 years 7 were women

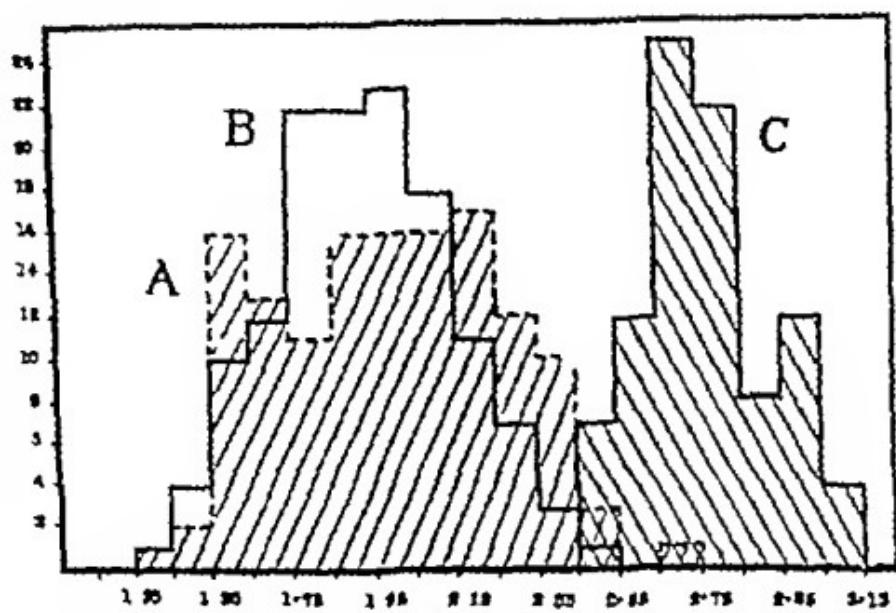
estimated by Haldane's method, 13.8 gm. corresponding to 100 per cent. and the tube in use was checked by Van Slyke determination. Sedimentation rate and mean corpuscular volume were determined by the Wintrobe tube method.

American figures for the haemoglobin have generally been found a little higher than those recorded by investigators in England. The author gives his own findings and those of other authorities—Porter-JONES, OSGOOD, HASKINS, TROTTER, VATTMAN, GOODRICH, WILSON and HYMES, JENKINS and DOX—for comparison. For these the original must be consulted. In the author's cases, the average red cell count ranged between 4.85 and 6.37 million per cmm., with an average of 5.48. The haemoglobin average was 110 per cent. Haldane = 15.2 gm. the limits being 94 per cent. (13.0) gm. and 125 per cent. (17.4 gm.). The mean corpuscular volume (obtained by dividing the volume of packed red cells in cc. per 1,000 cc. blood by the number of cells in millions per cmm.) was 84.8 (limits 78.3 and 90.0), the mean corpuscular haemoglobin (average Hb content per cell expressed in μ grammicrograms and = $\frac{\text{Hb in gm. per 1,000 cc. blood}}{\text{Red cells in millions per cmm.}}$) was 27.6 (μ gm.) 24.5 and 29.5, and the mean corpuscular haemoglobin concentration (Hb in gm. per 100 cc. blood) was 33.0 (limits 30.4 and 35.1). The sedimentation rate ranged between 1 and 7 mm. (Wintrobe's tube) with an average of 3.8. Much higher readings even up to 18 were obtained if the tubes were not placed to stand absolutely perpendicular. The individual findings are detailed in tabular form in a useful appendix, and the author concludes that his studies "indicate the wide variations in these figures which are compatible with truth. In the application of haematological standards to clinical medicine therefore it is the normal range rather than the average figure which is of practical importance." [This is a matter often forgotten when figures for a single case are recorded in disease and departures from the norm are regarded as abnormal.]

H. H. S.

HOLIDAY (Ennor Roslyn), KERRIDGE (Phyllis M. Tookley) & SAWYER (Frank Campbell). Amount of Haemoglobin in the Blood. *Lancet* 1938, Sept. 21, pp. 661-663. With 2 figs. (40 refs.)

The authors point out that the amount of haemoglobin in a given volume of blood cannot at present be accurately estimated, and that the percentage of haemoglobin relative to a "normal" standard is accurate only for the apparatus employed and differs widely with different instruments. In this paper the haemoglobinometers at present in use are critically surveyed. It is pointed out that the most satisfactory standard would be afforded by known concentrations of pure haemoglobin, but as this is not yet practical recourse has to be made to certain chemical and physical constants of haemoglobin. Iron content and extinction coefficient at the head of one of the absorption bands of haemoglobin are the most reliable and easily determined constants of haemoglobin. The latter was used in calibrating the photo-electric haemoglobinometer described in this paper. The normal value which corresponds with 105.5 per cent. on the Haldane scale, was translated into terms of extinction coefficient by parallel determinations with a photo-electric haemoglobinometer and a Haldane



Frequency polygons of weighted means of polynuclear counts. A British airmen B, Iraqi nationals C Cooke & Ponder's health standard group



Frequency polygons for weighted means of polynuclear counts for rabbits in Iraq whole line and in Britain, dotted line

[Reproduced from the *Transactions of the Royal Society of Tropical Medicine and Hygiene*]

H H S

IXCLAN (Clemente) & SANTAMARINA (Victor). Estudio de la sangre del niño recién nacido normal [Study of the Blood of the Normal Newborn Infant]—*Archivos Med. Infantil*, 1935 July-Aug.-Sept. Vol. 4 No 3 pp 125-167 With 37 graphs & 10 figs.

There has been in recent months a considerable activity in reporting the results of blood examinations. Attempts have been made to establish normal standards of the constituents for persons of different ages.

4 were men. The lowest number of counts made in any one individual was 11, the highest 85. Nine were fairly closely similar (see table vi) and are therefore regarded as normal; two differed from the others and were designated abnormal, although nothing was detected physically to account for the difference. They were considered to be "in a more emotional state than the others," and psychological conditions have been known to be accompanied by a leucocytosis. The mean normal range was seen to be considerable, from 4,000 to 8,000, an increase over 100 per cent. from the lowest to the highest. Sex, season, sex, nor age appeared to exert any material influence on the total count.

	Case	Lowest	Highest	Average
Normal	1	4,700	10,700	7,7
	2	4,200	10,600	7,18
	3	4,000	9,300	6,4
	4	3,700	10,000	6,4
	5	4,300	10,700	7,1
	6	4,300	9,600	6,68
	7	4,000	8,300	5,58
	8	6,200	8,600	7,25
	9	4,300	7,500	6,11
Abnormal	10	5,300	12,600	8,88
	11	6,400	12,900	9,10

H. H. S.

KENNEDY (Walter P.) & MACKAY (Ias.). Further Studies on the Polynuclear Count in Iraq.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1935, Nov 25, Vol. 29, No. 3, pp. 291-298. With 4 figs. [11 refs.]

In a previous paper Kennedy demonstrated a marked shift to the left in the Arneth count of natives of Iraq [see this *Bulletin* 1935, Vol. 12, p. 528]. With a view to testing whether this was the effect of or was influenced by infection or race, the authors made further investigations on 134 healthy British airmen and officers stationed near Basra. None had been there for less than 6 months. They also made such observations on the blood of 32 rabbits, determined healthy by autopsy. They found that the "weighted mean" of the polynuclear count was better standard than the Arneth index. The weighted mean is found by multiplying the total cells in each class by the number of the class, summing the results and dividing by the number of cells counted. For the Iraqi this was 1.99 for the airmen 1.94. The accompanying graphs demonstrate clearly the definite move to the left both in human beings and in rabbits as compared with figures in Britain and also that there is no marked difference between the British airmen in Iraq and the natives. No explanation is given but it is suggested that "Climate and heat are probably important factors." Records from other countries on these lines would be of great interest, not only for comparison but also as a help towards elucidating the reason.

of young forms of neutrophiles the Arnest count showed a definite shift to the left. There appeared to be no constant relation between the numbers of large and small lymphocytes. Lastly the coagulation time. In the newborn this was very rapid oscillating between $\frac{1}{2}$ and $\frac{1}{4}$ minute in the great majority of cases a few showed a clotting time as long as one minute.

[This article has been dealt with fully because although the findings confirm in many particulars those recorded for European children at home, such details have not been worked out in native infants.]

H H S

Osgood (Edwin E) Normal Hematologic Standards.—*Arch Intern Med* 1935 Nov Vol 56 No 5 pp 849-863 With 6 charts. [14 refs.]

This study with a view to establishing the normal blood standards is worthy of the highest praise. By examining in detail the blood from a large number of persons living in or near Portland, Oregon all apparently healthy and native born the author has determined as accurately as he could the normal erythrocyte and leucocyte totals haemoglobin values in percentage and, what is of much greater value in grams, the cell volumes reticulocyte counts differential leucocyte counts sedimentation rates and so forth for both males and females children from 4 years of age to adults of 30 years or more. He has thus established the local standards and his table will be of great use for comparison elsewhere. The details and choice of methods are given in the original, to which reference can be made but most if not all of them will be found in good modern text-books on haematology.

In order that others may have the standard for comparison Dr Osgood's table is reproduced. In only one investigation that of reticulocyte percentage were there less than 500 persons examined.

Hematologic Values obtained for Healthy Subjects in the Present and Similar Series

	No of Subjects	Age Years	Sex	Average Values		Range of Values
				Clinical	Actual	
Erythrocyte count millions	215	4-13	M & F	5.0	(5.04)	4.2-5.8
	259	14-30+	M	5.4	(5.42)	4.8-6.2
Hemoglobin, percentage	152	14-30+	F	4.8	(4.83)	4.2-5.4
	215	4-13	M & F	85	(85.90)	70-100
	259	14-30+	M	115	(114.82)	100-130
Hemoglobin, gm.	152	14-30+	F	100	(100.80)	85-115
	215	4-13	M & F	12.0	(11.92)	10.0-14.0
	259	14-30+	M	15.8	(15.84)	14.0-18.0
Hemoglobin coefficient	152	14-30+	F	13.8	(13.91)	11.5-18.0
	215	4-13	M & F	12.0	(11.87)	10.20-
	259	14-30+	M	14.7	(14.68)	12.75-
Cell volume, cc. per 100 cc.	152	14-30+	F	14.3	(14.41)	12.50-
	215	4-13	M & F	38	(38.02)	31-41
	46	14-17	F	38	(38.73)	31-41
	63	14-19	M	41	(40.14)	38-45
	106	18-30+	F	41	(40.96)	36-45
	153	20-30+	M	45	(44.79)	40-50

races or living in different localities [see pp. 75-8] but the majority of these examinations have been made on adults, a few on children, but none so far as the reviewer is aware on the newly born. The results of blood examination in young children are by no means infrequently misinterpreted because the medical man regards what may be closely approximating the normal in a child as a grave departure from what he has come to recognize as the normal (for adult). (It is a departure, but is not of the significance that a similar departure would be in the case of an adult.) The value of this investigation is therefore great, for examinations were undertaken practically at birth and repeated during the early days of life and took account the red corpuscles, their numbers and characters, the haemoglobin (unfortunately stated as percentage only), the leucocytes, the Anæth count and the coagulation time. A few words are called for on each of these for further details the original article which is embellished by many graphs and several photomicrographs, must be consulted.

An introductory section gives some general remarks to the effect that at birth the blood and lymphocytic factories are in process of development and that irregularities in the blood picture are to be expected young forms of cells are more common, myelocytes and even promyelocytes are by no means rare, immature red cells are equally common all evidence of hyperactivity of the blood factories.

Among the erythrocytes anisocytosis is readily observable (there is a good illustration of this) and the smaller forms are particularly common in the early days of life. Polychromatophilia is constantly present and very marked in the first 2-3 days normoblasts are present up to as many as 8 per cent. and even 18 per cent. has been seen. Megablasts have been reported by others but the authors very rarely see them. They determined that there was a very definite erithrocyte curve or more strictly a definite variation from day to day. It is a polyglobuly, purely physiological, with a total of over 6 million falling in 24 hours or so to a little over 4 million, and rapidly rising again to six and by the fifth day about 5-5. The haemoglobin also was oscillating between 100 and 130 per cent. sometimes remaining but to the 7-8th day (when examinations ended) at other times falling to 80-90 per cent. [This statement loses much in that the mode of estimation is not stated, and these as is well known, vary greatly in accuracy estimation in grams per cent. would be far safer and give more information.]

The leucocyte total also is variable. It is high at birth and is found to vary on the first day between 18 000 and 36 000 per c.c.m., but fell rapidly by the third day to between 8,500 and 14,000 and lay between these limits till the end of examination (8th-9th day). The relative counts showed interesting variations. At birth the polymorphonuclears usually preponderated enormously 82-84 per cent., lymphocytes 7-4 per cent. within a day or two the former fell to 65-68 per cent. and the latter rose to 15 or even 23 per cent., and at the 8th or 9th day the lymphocytes usually exceeded the neutrophiles, and by the 12th day they might be equal. Eosinophiles were more frequent than large mononuclears the two together varied between 0 and 10 per cent. on rare occasions eosinophiles were as high as 12 and even 15 per cent. it was very exceptional for monocytes to be as numerous as this. The authors saw no basophile cells. Young forms of neutrophiles were seen in a proportion of 4-10 per cent., myelocytes about the same, and stabbermages from 10-35 per cent. Owing to the large proportion

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two in two of the cases only). In one case there are superadded inflammatory changes of cholangitis and surrounding infiltration but the lesions in the others are as follows. The hepatic cells are necrosed generally throughout the liver some more others less in the meshes of an oedematous non vascular connective tissue are islets of hepatic tissue some degenerating the hepatic vessels but not the portal show obliterative lesions (well demonstrated in the camera lucida drawings) with disorganization of the reticulum of the sinusoidal capillary bed round these venous terminals and, lastly attempts at regeneration of the parenchymal cells.

The microphotographs and the coloured camera lucida drawings are very clear and instructive.

The genesis of the fibrous tissue is traced to atrophy and degeneration of the parenchymal mantle around the hepatic venous tree (due to an interference with the free flow of portal blood) owing to sclerosis of the veins and endophlebitis. The changes are in fact those described in toxic cirrhosis but the coexistence of regenerative and degenerative processes indicates a toxin of sub-acute properties the determination of which must be the subject of further investigation. H H S

CULBERTSON (James T) Antibody Production by the Rabbit against an Ectoparasite.—*Proc Soc Experim Biol & Med* 1935 May Vol 32 No 8 pp 1239-1240

The serum of rabbits heavily infested by the mite *Psiroples communis* var *cuniculi* gives a precipitate with an extract from the bodies of the mites, whereas the serum of uninfested rabbits does not. The sloughing of the affected skin is possibly an Arthus reaction resulting when the specific antigen of the mite saliva is introduced into the sensitized animal.

J B Wigglesworth

BISHOPP (F C.) & SMITH (Carroll N) Mosquito Work throughout the World in 1934—Reprinted from *Proc 22nd Ann Meeting New Jersey Mosquito Extermination Assoc Mar 6 7 & 8 1935* 27 pp

The paper which is one of a series appearing every year summarizes current work on mosquitoes and their relation to disease. It deals among other things with taxonomy, the relation of mosquitoes to malaria and yellow fever surveys in particular areas, efforts at control and studies on food, resting places and hibernation. The paper concludes with a special section on the control of mosquitoes in North America.

It is difficult to give a short résumé of something which is in itself a review. Perhaps the British reader familiar at first hand with the greater part of the work will be most interested in the account of the extensive operations carried out in the southern part of the United States. The work there was undertaken partly in the interests of health, partly to provide useful work for the unemployed under the Emergency Relief Administration. We understand that a vast amount of draining and such work was carried out but that there is some question whether the rural population in the areas drained will be able to maintain the work in a normal year and whether the ditches may not themselves become dangerous breeding places.

P A Buxton

FIEGE (Lan-Chou). The Present Status of the Knowledge of the Mosquitoes of China and their Relation to Human Diseases.—*Chinese Med J.* 1935, Vol. 49, No. 11, pp. 1183-1208. With 2 charts, 1 map & 10 figs. on 6 plates. [72 refs.]

The author presents a full review of our present knowledge of the mosquitoes of China and of their relation to malaria, filariasis and dengue.

Of the species of *Anopheles*, *Anopheles hyrcanus* is the most widely distributed for it is found in plains of most parts of China. In South China some fifteen species of *Anopheles* occur, most of them derived from the Oriental Region. In this area the most important carriers of malaria appear to be *A. minimus* and *jeyporensis*; though *marteri* also occurs. The southern species extend northwards to approximately 30° North. In the north of China (from 35° to 40° North) the most important species is *Anopheles pallidus* which breeds in the lakes generally in running water. Distribution of the Culicines, which is discussed less fully, also shows that the fauna is partly southern, partly northern in origin as is natural in so great a territory. The paper includes a tabulated statement of what is known of the infection of *Anopheles* in China with *Plasmodium*—the author has included the results of dissection of wild specimens and the experiments carried out in laboratories. He proceeds to discuss the species principally concerned in transmission.

The section dealing with types of malaria and their distribution is not so full and it is confined mainly to what has been learned since the subject was reviewed by FALSTAD in 1926. It is clear that south of the Yangtze River malaria is widely spread and of greater or less gravity also that all three types of parasites occur. In North China malaria is less abundant and it is generally of the benign tertian type.

Some years ago the author gave an account of the distribution of filariasis due to *Wuchereria bancrofti* in China. The disease is particularly abundant in the provinces along the south part of the coast and along the lower course of the Yangtze River. Recent work has shown that *Microfilaria malayi* is not rare and that it is rather widely spread. The mosquito hosts of these parasites have been investigated in the laboratory and it is now clear that *Culex fatigans* is not the only carrier of *W. bancrofti* in China, indeed it is less efficient than *C. pipiens*. Several other mosquitoes have been studied and shown to be incidental carriers, but it seems that species of *Anopheles* transmit it readily enough. *Microfilaria malayi* develops well in *Anopheles* and in *Viviparous*. Results of dissecting wild mosquitoes, mostly taken from horses, are also reported, but the author is wisely sceptical of their value, recognizing how difficult it is to identify a larval nematode in a mosquito.

A full list of references brings this useful piece of work to an end. The paper will stimulate workers to supply information on many matters about which we know nothing at present.

P. A. B.

HEADLEE (T. J.) The Development of Mechanical Equipment for Sampling the Mosquito Fauna and Some Results of its Use.—*Proc. 19th Ann. Meeting New Jersey Mosquito Extermination Assn.* 1932, pp. 106-126. With 2 plates.

BRADLEY (G. H.) & MCNEIL (T. E.) Mosquito Collections in Florida with the New Jersey Light Trap.—*Jl. Econom. Entom.* 1935, Oct., Vol. 28, No. 5, pp. 780-786.

The papers deal with an automatic device electrically operated which will obtain a sample of mosquitoes throughout the night.

The author of the first paper points out that much of what we know about the distribution of mosquitoes and about their density is based on collecting by hand. In this process there is a large element of personal error. He has been anxious to substitute some more standardized and perhaps more effective method, and he has finally produced a trap into which a 50-watt Mazda lamp attracts mosquitoes and from which they are swept by a fan into a cyanide bottle. In its final form the trap catches roughly twice as many insects per hour as an expert man including large numbers of all the commoner species. By making slight alterations to the trap the author has accumulated information about the time of night at which certain species fly.

The second paper sets out results obtained in Florida and shows that the trap has considerable utility—it catches a great variety of species including many males and considerable numbers of Anopheles of several species. The paper contains detailed information about several mosquitoes which are locally important. It is not suggested that the trap obtains an unbiased sample of all the prevalent mosquitoes but it is clear that its results give a valuable confirmation of what may be obtained by other methods.

P A B

RUSSELL (Paul F.) & BAISAS (Francisco E.) The Technic of Handling Mosquitoes.—*Philippine Jl Sci* 1935 Mar Vol. 56 No. 3. pp 257-294 With 12 figs. & 8 plates [27 refs.]

The ground covered by this paper which is concerned with conditions in the Philippines is a good deal wider than might be inferred from the title, and includes the collecting of both larvae and adults in addition to subsequent operations. While the bulk of what is stated is to be found in one form or another in various text-books and should be familiar to the expert the beginner who studies these pages cannot fail to acquire useful information. *Inter alia* whosoever aspires to become a competent collector of mosquito larvae is warned that he will never do so if he fear to wet his feet but by way of compensation he is told that a diurnal search for adults in typical shelters such as small caves, presents no difficulties apart from the fact that snakes occasionally choose to lie up in the same retreats. Artificial daytime shelters [presumably free from the last-mentioned drawback] can be made by lining boxes with moist earth, and a simple but ingenious method of doing so is duly described.

E E Austin

DE MEILLON (Botha) & OSBURN (H S) A Case of Intestinal Myiasis caused by the Larvae of *Chrysomya chloropyga* Wied. (Diptera, Calliphoridae)—*South African Med Jl* 1935 Sept. 28 Vol. 9 No. 18. pp 654-655

The patient, an African girl passed numbers of larvae in her stools after a vermicide had been administered. Her mental state subsequently became brighter and the fits of which she had complained less frequent.

The identification of the fly was made on larval characters adults not being bred. *Chrysomya chloropyga* is a widely distributed African insect breeding commonly in carcasses and occasionally causing external myiasis of man and animals especially sheep. It seems that there are no recorded cases of intestinal myiasis, due to this or other

FENG (Lan-Chou). The Present Status of the Knowledge of the Mosquitoes of China and their Relation to Human Disease.—*Chinese Med JI* 1935. Nov. Vol. 49 No. 11 pp. 1183-1208. With 2 charts, 1 map & 10 figs. on 6 plates. [72 refs.]

The author presents a full review of our present knowledge of the mosquitoes of China and of their relation to malaria, filariasis and dengue.

Of the species of *Anopheles* *Anopheles typhonius* is the most widely distributed for it is found in plains of most parts of China. In South China some fifteen species of *Anopheles* occur most of them derived from the Oriental Region. In this area the most important carriers of malaria appear to be *A. minimus* and *jeyporensis* though *sinensis* also occurs. The southern species extend northwards to approximately 30° North. In the north of China (from 35° to 40° North) the most important species is *Anopheles fassoni* which breeds in the hills generally in running water. Distribution of the Culicines, which is discussed less fully also shows that the fauna is partly southern, partly northern in origin as is natural in so great a territory. The paper includes a tabulated statement of what is known of the infections of *Anopheles* in China with *Plasmodium*—the author has included the results of dissection of wild specimens and the experiments carried out in laboratories. He proceeds to discuss the species principally concerned in transmission.

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members of the genus *Chrysomya*. It is remarkable that cases have been observed, for it is evident from the facts here recorded that the insect can support life in the human intestine. P. A. E.

PARISH (H. E.) & LAAKE (E. W.). Species of Calliphoridae concerned in the Production of Myiasis in Domestic Animals, Mexican Coast, Texas.—*Jl. Parasitology* 1935 Aug Vol. 21 No. 4 p. 264-298.

The purpose of the observations described in this paper was to determine what other flies besides the screw worm fly (long referred to as *Cochliomyia macellaria*, but now known to be really *C. hominivorax*—see the *Bulletin* 1934 Vol. 31 p. 359) are responsible for wound myiasis in domestic animals in the south-western United States and the extent of the injury so caused. The latter question is not dealt with in detail, but the results of collecting and breeding out maggots from wounds in sheep, goats, calves and cattle during the period August, 1931 to July 1933, are summarized. In summer and autumn, screw worm flies formed more than 99 per cent. of all adults reared from larvae found in wounds on the above mentioned livestock. On the other hand, during the spring of 1933 upwards of 67 per cent. of all flies so obtained were *Phormia regina*, a cold weather species of blowfly and very abundant during early spring. In two or three cases a few larvae of a flesh fly, *Sarcophaga* sp., were found. E. E. A.

JAMES (J. F.). A Simple Fly Trap.—*Jl. Roy. Army Med. Corps* 1935 Dec. Vol. 65. No. 8. pp. 400-401. With 2 figs. [Summary appears also in *Bulletin of Hygiene*]

The author describes a trap easy to make and without the disadvantages of the commonly used wooden trap with rollers. The accompanying illustrations give a good idea of the contrivance. A piece of ordinary galvanized tin 14 in. by 9 in. by 9 in. is cut away as shown in Fig. 1, the lower line being 3 inches from the base and the upper bisecting the top. If desired straight cuts may be made as in Fig. 2, thus rendering rectangular instead of an inclined plane or shovel-shaped part. Stout wire across the top, 2 inches from the back, serves the double purpose of hanging up the trap and of supporting material, such as

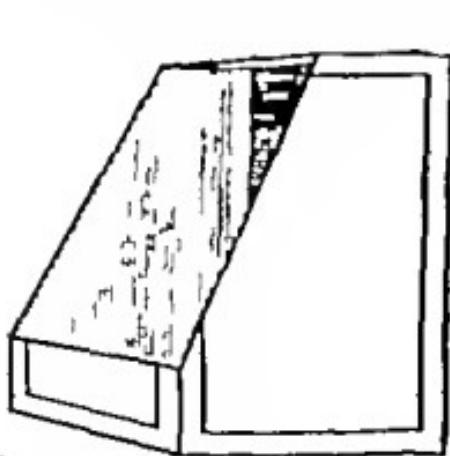


Fig. 1

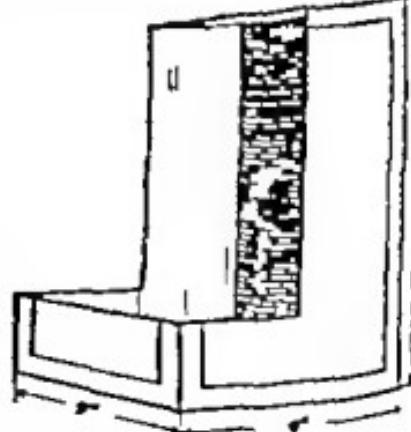


Fig. 2

Fly traps, made from galvanized or similar tin receptacles, to contain sugar or gas arsenic poison bait.

[Reproduced from the *Journal of the Royal Army Medical Corps*]

gunny which passes down to the bottom and covers the floor of the tin on which the poison chosen is placed about an inch deep. The lower part of the gunny is thus kept wet and the back can be wetted by merely laying the tin on its back. The tins are collected, cleaned and the solution changed twice weekly under the direct supervision of a sanitary inspector

H H S

GENEVRAY (J) GASCHEN (H) AUTRET (M) & DODERO (J) Paederus vesicants (*P. fuscipes* et *P. alternans*) au Tonkin. Etude entomologique clinique et expérimentale. [Vesicating Paederus in Tonking]—*Arch Inst Pasteur d Indochine* 1934 Apr No 19 pp 313-329 With 1 coloured plate & 9 figs. on 5 plates. [18 refs.]

As is well known to the natives most cases of vesicular dermatitis in Tonking are caused by the beetles *Paederus fuscipes* and *P. alternans*. The toxic substance has chemical properties identical with those of cantharidin. When applied to the skin of man or animals it produces lesions of the same kind as does cantharidin and when injected it causes a glomerular nephritis. This active principle occurs in the blood of the insect and therefore escapes from any part of the body that is crushed

V B Wigglesworth

PERRY (H. Marrian) & POOLE (L. T.) A Common Caterpillar Injurious to Man.—*Jl Roy Army Med Corps* 1935 Oct Vol 65 No 4 pp 217-220 With 3 figs. & 1 plate.

Skin lesions due to the larvae of the Brown tail Moth *Euproctis chrysorrhoea* can be caused by any of the larval hairs. Cases are described which show that the sensitivity of different subjects varies greatly and that the rash may vary from a transient urticaria to a vesicular rash requiring several days to develop

V B Wigglesworth

HAPPOLD (Frank Charles) & STEPHENSON (Dora) The Toxicity of Bactericidal Substances for Flagellate Parasites with Special Reference to their Application in the Isolation of *Leptomonas* Forms.—*Parasitology* 1935 July Vol 27 No 3. pp 383-393

In a previous paper BOXHALL, Happold and LLOYD (*Parasitology* 1934 Vol 26 p 44) have shown that cultures of leptomonads of certain flies can be obtained free from bacteria by mixing the intestinal contents with certain concentrations of quinanil and allowing the mixture to stand for some time before inoculation into culture media. The exposure to quinanil in some cases destroyed the bacteria and not the flagellates. The present paper describes the testing of other substances with the result that besides quinanil the compound 2 (β -dimethyl aminoanil)- β -naphthoquinoline methochloride might be successfully used. For the purification of contaminated leishmania cultures the procedure was not successful.

C M Neeson

TOKURA (Y.) Biologische und immunologische Untersuchungen
die menschenparasitären Trichomonaden. [Biological and Immu-
nological Research on Trichomonads Parasitic for Man.]—Reprint
from *Igaku Kenkyū* 1935 Apr Vol. 9, No. 4. [In Japanese]
[325 refs. German summary 13 pp. With 19 figs on 8 plates]

Working with cultures of various human trichomonads the author has found that their intravenous injection into rabbits results in the formation of species specific immune bodies the presence of which is indicated by the property of producing lysis in dilutions up to 1 in 4 and agglomeration in dilution of 1 in 6 of the flagellates in question. A trichomonad antigen is as capable of giving rise to complement fixing bodies as are bacteria. These serological studies with trichomonad flagellates appear to be the first of their kind. C.M.F.

GURIA (B. M. Das) Some Observations on Pure Line Strains of *Tri-
chomonas hominis* and Trichomonas of the Snake *Vipera crotalina*
(a Non-Poisonous Water-Snake).—*Jl. Trop. Med. & Hyg.* 1935
June 15. Vol. 38 No. 12 pp. 148-151 With 25 figs &
plates.

The morphology of both *Trichomonas hominis* and a *Trichomonad* of the snake is described from pure line cultures started from single individuals. Both forms possessed four anterior flagella and one on the undulating membrane. The membrane flagellum in some cases became detached and acted as a trailing flagellum but in such cases there was actual resemblance to *Entamoebadix* which is a distinct flagellum in the snake. In the case of *Trichomonas hominis* the dividing form appeared to indicate that the axostyle divides longitudinally. C.M.F.

VITTORIO (Vanni) Ricerche sulla sarcosporidiosi. [Investigazioni sulla Sarcosporidiosi].—*Ann. di Med. Veterinaria e Colon.* 1935. Vol. 47
41st Year Vol. 1 No. 3-4 pp. 145-181 With 31 figs (11
coloured) on 5 plates. [34 refs.]

In this paper the author describes certain experiments he has made with the sarcosporidian of the sheep *Sarcocystis tenella*. He claims to have discovered that the spores ingested by flies (*Sarcophaga* and *Calliphora*) in the course of 24-48 hours become converted into metacyclic forms some of which at least are provided with flagella. These metacyclic forms are passed in the faeces of the flies. Of two rats fed with the faeces of infected *Sarcophaga* and two with those of *Calliphora*, one of the latter 40 days later was found to have developing sarcosporidia in most of the muscular system. As rats fed with spores taken directly from the sheep did not become infected it is concluded that *Calliphora* is the intermediate host of *Sarcocystis tenella*. The changes which take place in the flies are illustrated in a series of plates. Though the authors state that they have been careful to exclude flagellated and other natural infections of the flies one is still left with the impression that some of the so-called metacyclic forms, particularly the flagellata, may actually be natural parasites of the flies. C.M.F.

CHEISSIN (Eug.) Vom Einfluss anaerobter Bedingungen auf verschiedene Sporulationsstadien der Oocysten von *Eimeria magna* und *Eimeria stiedae* [Effect of Anaerobiosis on Development of *Eimeria*.]—Arch f. Protistenk. 1935 Vol. 85 No 3 pp 426-435 With 1 fig

Under anaerobic conditions the oocysts of rabbit coccidia will neither begin nor complete sporulation though the intervening development will take place.

C M W

CIFERRI (R.) & REDAELLI (P.) Une quatrième espèce du genre *Histoplasma*. [A Fourth Species of the Genus *Histoplasma*.]—Boll Sezione Ital Soc Internaz di Microbiologia Milan 1935 July Vol. 7 No 7 pp 245-252

The authors refer to three papers recently published by them. In the first they showed, experimentally that Darling's Histoplasmosis is a mycosis of the reticulo-endothelial system in the second they advanced arguments for the inclusion of *Cryptococcus sarciniformis* Riv. & Mic. in the genus *Histoplasma* in the third they pointed out affinities existing between *H. sarciniformis* (Riv. & Mic.) Cif. & Red. and *H. capsulatum* Darling and described a third species of the genus *H. muris*.

The present paper attempts to show that a yeast like fungus isolated from a disease resembling dermatitis exfoliativa by Hansmann and Schenken in the United States and named by them *Sepedonium* sp. Hans. & Schenk. is in reality a new species of *Histoplasma* the fourth species of the genus.

Ciferrri and Redaelli refute the recommendation of Moore that the fungus should be placed in the genus *Poxadasia* Canton as *P. pyriformis* Moore on the grounds that insufficient evidence was put forward.

In giving their reasons for naming the new fungus *Histoplasma pyriformis* (Moore) Cif. & Red. n. comb. Ciferrri & Redaelli admit that, up to the present they have had no opportunity to examine the fungus in culture or in the tissues and their study was limited to the published description by Hansmann and Schenken and the accompanying photomicrographs.

The clinical condition is of great interest and the description should be read in the original paper by Hansmann and Schenken. It commenced as a dry scaly lesion on the back of the leg and spread gradually over the whole surface of the body suggesting dermatitis exfoliativa but the ultimate diagnosis was dermatitis associated with lymphadenitis. The disease resisted treatment and ended fatally after a duration of fifteen years. In addition to the skin and lymphatic lesions the mouth showed a local condition of thickening of the mucosa with little granular lesions erosions and ulceration.

The fungus was isolated during life from the skin an inguinal gland and the buccal mucosa, and sections of the tissues showed it to be present as little yeast like bodies chiefly enclosed within phagocytes and endothelial cells but occasionally free in the tissues.

The autopsy showed no enlargement of the spleen or liver but cirrhosis of both these organs all the superficial lymphatic glands were enlarged and hard and contained the parasite the adrenals showed zones of caseous necrosis resembling tuberclosis in both medulla and cortex and the parasite was present in the lungs the parasite assumed

to increased perspiration and salt loss through the skin. This will increase the tendency to the separating out of certain urinary constituents.

(2) An increased oxalate and phosphate excretion is the result of an atta diet—and on account of the reduced urine volume an increased concentration of these substances in the urine. The amount of calcium excreted in the urine is more than sufficient to combine with the oxalate and form an insoluble salt."

H.H.S.

MARTIN (Hubert). The Standardisation of Petroleum and Turpentine and Preparations as Insecticides—*Int. Applied Biol.* 1950, May, Vol. 22, No. 2, pp. 334-414. [With 1 fig. 74 refs.]

The scope of this paper is indicated by its title. It is concerned here because emulsions containing mineral oils are frequently used to control insects of medical importance.

Users of insecticides and fungicides have a right to demand some form of guarantee that the products should reach a reasonable standard of efficiency and should not vary greatly in quality. Some detailed specifications are therefore desirable to which manufacturers will agree to conform, in the same way as "A.R." reagents and drugs are made to conform to specifications. At the suggestion of a committee set up by the Conference of Advisory Entomologists in December 1950, the author undertook to draw up draft specifications and methods of analysis which are here presented with a rather full review of the evidence in their favour.

A number of items are specified by an oil company of which some such as flash and fire points, pour and cold tests, are quite unsuited for this purpose. Those which are useful are the distillation range (some writers prefer a measure of the volatility at ordinary temperature), viscosity and specific gravity (useful because it gives information as to composition, e.g. more aromatics, higher S.G., and is very simple to measure) among physical properties, and the unsulphonated residue or some equivalent test among chemical properties. If the material is a preparation which requires only dilution with water to be ready for use, it should be specified whether it is a "miscible oil," i.e. a pH solution of an emulsifier such as fatty acid soap or beta petrochemical sulphonic acid soap in the oil, or a "stock emulsion," i.e. concentrated emulsion—the emulsifying agent should be given.

The correlation between the physical and chemical properties of an oil and its biological performance is facilitated by distinguishing between winter washes (for the dormant and leafless plant) and summer washes (for the foliage-bearing plant).

With winter washes most workers have found insecticidal action not very dependent on physical properties. Above a certain minimum viscosity it is independent of this property and within wide limits is independent of boiling range. The unsulphonated residue should not be less than 60 per cent. i.e. 60 per cent. of paraffin should be present. As this represents some degree of refinement, other chemical specifications are unnecessary. The type of emulsifier does not appear to influence the insecticidal activity but the oil should be 100 per cent.

"neutral oil" and free from alkali. Phytocidal activity may be neglected for winter washes so that specific gravity, viscosity, boiling range and unsulphonated residue form a sufficient specification, together with oil content if it is a preparation capable of direct dilution with water.

With summer washes the phytocidal aspect is more important than the insecticidal. The latter as for winter washes is largely independent of physical properties over a wide range. There is no evidence that increased refinement diminishes the insecticidal potency. Phytocidal injury is of two types (a) acute, in which leaf tissue perishes in a few days this is attributable to chemical constituents (b) chronic, appearing later and associated with metabolic changes possibly brought about by physical factors. Thus high viscosity may affect transpiration reports having been made that apples are smaller on trees treated with heavy lubricating oil although it was devoid of constituents causing acute damage. This suggests that an upper limit to viscosity and boiling range should be specified. Acute phytocidal injury is acknowledged to be due to those constituents which are removed by sulphuric acid and the unsulphonated residue should definitely be fixed at a high figure—80 per cent is recommended. The author believes it unnecessary to give the iodine value and the same four criteria are sufficient as for winter washes with more precision in the ranges allowed. Since many users of sprays like to make a combined wash with some other insecticide or fungicide the manufacturer should state whether the emulsifier is such that it can be mixed with lead arsenate lime-sulphur or Bordeaux mixture etc.

For intermediate bud burst washes some modifications are permissible and the unsulphonated residue may be fixed at a minimum of 80 per cent.

Tar Oils—Tar oils differ from petroleum oils in the almost complete absence of paraffins and naphthenes and the presence of tar acids and tar bases. Industrial specifications usually give content of neutral hydrocarbons tar acids and bases as well as specific gravity and boiling range.

Tar oils are less effective than petroleum oils against eggs of geometrids and capsids and to some extent against acarids but more effective against eggs of aphids and psyllids. It is, therefore supposed that they have a direct toxic action apart from their physical stifling action. Higher boiling fractions are more toxic as with petroleum and support the hypothesis that permanence of the film is the important factor.

The general conclusion of workers is that tar acids do not contribute very much to insecticidal power are in fact less efficient than the neutral oils. The same applies to tar bases on which however less work has been done. The solid hydrocarbons of tar oils also seem to contribute little to the toxicity and are objectionable to the user.

Tar oils have considerable phytocidal action as might be expected both the aromatic hydrocarbons and the tar acids being active. Nevertheless some workers have reported no injury to young buds of gooseberry or currant with 10 per cent. tar acid content. Normally however tar oils are only used for winter washes or their phytocidal properties are turned to account to combat mosses and lichens.

The different susceptibility of eggs to tar and petroleum oils makes it often advantageous to combine these oils in a dormant wash. It has become customary in fact to include a small proportion of high boiling petroleum oil in tar oil without disclosing it. An extra specification the amount insoluble in dimethyl sulphate (in which aromatics are entirely soluble) is therefore desirable. For a simple tar oil it should be nil but up to 10 per cent. is permissible in a marketed tar oil and more in a tar petroleum preparation. A maximum figure should be allowed in

imagines, adding that "it may be of great value to continue observations on them over the whole period during which anti-malaria work is in progress and for some time afterwards." He further observes that — "The presence of males at one end of a town and not at the other is an indication that the breeding-places are in the districts where the proportion of males is greatest, and that the anopheline population of the town is being derived from that quarter. For the estimation of the daily output from breeding places it may be necessary to determine the age of females and the various means of doing so (ovarian index, state of the abdomen and of the wing-fringe) is described.

The Table for Rapid Identification (pp. 133-147) includes fifty-five species and subspecies and those "recorded in the Malaya subregion but not yet from the Malay Peninsula," or myself difficult to distinguish, are specially marked. The next eight-plus pages are devoted to brief illustrated descriptions in amplification of the Table and the publication concludes with two Appendices, the first devoted to equipment and materials, the second consisting of lists of "Species Recorded from Neighbouring Countries (including the outlying islands).

Well printed, arranged and illustrated and (so far as the review has been able to observe) entirely free from typographical errors, this handy and useful volume forms a worthy complement to its forerunner.

E. E. Austin.

BUREAU OF HYGIENE AND TROPICAL DISEASES
TROPICAL DISEASES BULLETIN.

Vol. 33]

1936

[No. 7]

KALA AZAR.

MÁJERA ANGULO (Luis) Las leishmaniosis visceral y cutánea y su importancia en España [Leishmaniasis in Spain].—*Rev Méd Barcelona* 1935 Dec. Vol. 24 No 144 pp 509-528. With 3 figs. (maps) [110 refs.]

This paper is itself in the nature of a review discussing the incidence of leishmaniasis in Spain. Up to the end of 1934 a total of 892 cases of kala azar had been registered in the country together with 27 cases of oriental sore. These figures are compared with records from Portugal, Greece and Italy. The figures are not strictly comparable though they give some indication of the frequency of the disease in these countries. The distribution of the cases according to provinces ages sex and association with sandflies is fully discussed. C M WENYON

NEGRO VÁZQUEZ (Emilio) Algunos datos más sobre la leishmaniosis cutánea en el Levante de España. [Cutaneous Leishmaniasis in Levante, Spain].—*Medicina Paises Cálidos* Madrid. 1936 Feb Vol 9 No 2 pp 87-88.

The case of oriental sore here described and others which have been noted previously indicate that the disease is endemic on the Valencian coast of Spain. C M W

HERREIRO RUBIO (Pedro) Aportaciones al estudio del kala-azar infantil. [On Infantile Kala Azar].—*Medicina Paises Cálidos* Madrid. 1935 July Vol. 8 No 7 pp 338-344 With 5 figs.

In writing of infantile kala azar in the province of Alicante in Spain the author points out that spleen puncture may fail to reveal parasites and that the disease can be diagnosed from the clinical features and the characteristic blood picture. Such a diagnosis receives confirmation by the response to specific antimony treatment. C M W

QUARTERLY BULLETIN OF THE HEALTH ORGANISATION LEAGUE OF NATIONS Geneva. 1935 Dec. Vol. 4 No 4 pp 787-803 [72 refs.] On the Diagnosis Treatment and Epidemiology of Visceral Leishmaniasis in the Mediterranean Basin. I Serological Tests [CHRISTOPHERS (Richard)] II. Treatment [CARONIA SERGENT (Edm.) PITALUGA] III. Epidemiology [SERGENT (Edm.) & ADLER (S)]

These articles have been written and published mainly for the guidance of those who are not familiar with the subjects dealt with. They do not give any new information. C M W

PAPANTAKIS (E.) Série "leishmaniose" en Méditerranée. [Leishmaniasis in the Mediterranean Countries.]—*Riv. Ital. di Biol. Trop.* 1935 Nov.-Dec., Vol. 27 No. 6, pp. 279-310. [30 refs.]

A general summary of knowledge adding nothing new C. M. F.

FOURNIER (J.), GENOTTA (A.) & DUVERGER (M.) Un cas de leishmaniose viscérale de l'adulte observé dans la région de Bône. [Kala Azar in an Adult in Bône (N. Algeria).]—*Arch. Inst. Pasteur d'Algérie* 1935 Dec., Vol. 13, No. 4, pp. 492-494. With 2 figs on plate.

A case of kala azar in a man of 24 years of age. The disease was contracted in North Africa. C. M. F.

PAPANTAKIS (E.) Die Leishmaniosen in der Provinz Messini (Peloponnes Griechenland) [Leishmaniasis in Messenia Province, Greece].—*Arch. f. Schiffs- u. Trop. Hyg.* 1935 Apr., Vol. 9 No. 4, pp. 141-146. With 3 figs. (1 map).

In the mountainous north-west part of the Greek province of Messenia kala azar in young children and dogs has been endemic for many years. In the flatter south-eastern parts the disease does not occur. Sandflies of the *Phlebotomus major* group were taken in the districts where the human and canine disease occurred. C. M. F.

CHODRKOV (N. I.), PETROV (V. P.) & KEVORKOV (A. P.) [Epidemiology of Kala Azar in Tashkent.]—*Trans. Inst. Epidemiol. & Mental Tashkent*, 1934, Vol. I, pp. 73-145. [In Russian.]

In this paper the authors give an account of the observations conducted in the course of the preceding seven years on the epidemiology of kala azar in Tashkent (Russian Turkestan) which are summarized as follows:—

The distribution of kala azar is focal, the foci of human and canine leishmaniasis (the causative organisms of which are considered to be identical) coinciding in most cases. While dogs constitute the main reservoir carriers amongst other animals—though not proved—are not excluded. Kala azar has a tendency to spread slowly from the focus areas frequently dying out and then again reverting in the course of several years.

The seasonal incidence of leishmaniasis in Middle Asia is the same as that in India. Though children provided the majority of cases, infection in adults is not rare. Transmission is effected by sandflies.

Destruction of infected dogs is recommended as the most essential prophylactic measure. C. M. F.

CRAIAS (E.) Nota prévia. Primeira verificação em indivíduos vivos da leishmaniose visceral no Brasil. [First Case of Kala Azar diagnosed during Life, in Brazil.]—*Brasil Médec.* 1935, Vol. 11, No. 50, pp. 221-222. With 1 fig.

It has already been noted by PERNA [this Bulletin, Vol. 32, p. 45] that during the course of examinations of liver specimens obtained post-mortem from cases which had died of possible yellow fever occasionally leishmania infections were detected, indicating the probable

occurrence of kala azar in S America. The author of the paper now under review describes the first autochthonous case of this disease diagnosed during life. It was in a youth 16 years of age from Aracaju in the State of Sergipe. The features of the case and the parasites obtained by spleen puncture were characteristic of kala azar. It is noted that in the locality *Phlebotomus longipalpis* occurs in abundance

C M II

BERREBI (Jacques) La culture des leishmanies. [The Cultivation of Leishmania.]—*Arch Inst Pasteur de Tunis* 1936 Jan Vol 25 No 1 pp 89-141 With 2 charts. [85 refs.]

This is a long paper describing the results of the author's investigations on the culture of leishmania. He commenced with the classical N.N.N medium as a standard and by introducing various modifications has attempted to discover the factors which influence the growth of the flagellates. It is noted that the optimum concentration of sodium chloride is 1.5 per cent. that the optimum pH is 6 to 6.5 that heating the medium for purposes of sterilization is unsavourable that the agar base acts merely as a dialysing membrane which permits nutrient to pass into the liquid in a progressive manner that rabbit's blood can be replaced by the blood of man or sheep guineapig or rat but not by that of the horse dog or cold blooded animals that the addition of glucose lactose and particularly maltose helps the growth that manganese even in infinitesimal amounts hinders growth that calcium favours it while iron zinc magnesium and aluminium are inert that glycerol added to the liquid of condensation will permit growth of flagellates while killing off contaminating bacteria thus affording a means of purifying contaminated cultures that haemoglobin is not necessary for medium prepared as N.N.N medium with haemoglobin free serum will give a good culture when inoculated with flagellates though subculture into the same medium fails. It has not been possible however to elaborate another and better medium based on the foregoing data the classical N.N.N medium remaining the medium of choice for the cultivation and maintenance in culture of various leishmania and trypanosomes

C M IV

BLANCHI (Luigi) Die Blutmilch als Nährboden für Leishmanien. [Blood and Skimmed Milk Medium for Cultivation of Leishmania.]—*Arch f Schiffs- u Trop Hyg* 1936 Apr Vol 40 No 4 pp 146-150 With 3 figs.

The author has found that leishmania can be readily cultivated in a medium consisting of rabbit blood 1 part and skimmed goat's or cow's milk 8 parts.

C M II

SATO (Yasuchi) Investigations on the Biological Characters of *Leishmania donovani*.—*Jl Oriental Med* 1936 Mar Vol 24 No 3 [In Japanese pp 689-713. With 11 coloured figs on 1 plate [45 refs.] English summary p 43]

The paper describes the results of microchemical and vital staining tests carried out on cultural forms of *Leishmania donovani*. Various granules were brought to light including oxydase and peroxydase. The nucleus and blepharoplast were the sites of oxidation while reduction occurred in the cytoplasm, which gave a pH reading of 6.4 to 6.8.

C M IV

DA FONSECA (Flavio) Occorrença de formas anômalas na *Leishmania brasiliensis*. [Anomalous Forms of *Leishmania brasiliensis*—*Mem Inst Butantan* 1935. Vol. 9 pp. 185-186. With 2 coloured figs. on 1 plate facing p. 182. English summary (9 figs.)]

The author has shown that *Leishmania brasiliensis* exhibits the same degree of structural variation as does *Leishmania tropica* of oriental sore. The various types of parasites noted are illustrated by coloured plate.

C. M. F.

ACANTORA (Giuseppe) Osservazioni su alcuni casi di leishmaniasi [Some Cases of Leishmaniasis]—*Ann. di Med. Trop. e Colon.* 1935 Nov-Dec. (Supp.) 41st Year Vol. 2 No. 5-6 pp. 897-911. With 6 figs.

An account of 3 cases of kala azar and 2 of oriental sore which were observed at the clinic for tropical and sub-tropical diseases at Rome. One of the cases of oriental sore showed involvement of the oral mucosa.

C. M. F.

ALBANO (Vincenzo) Su di un caso di kala-azar spontaneamente in un bambino [Spontaneous Case of Kala Azar in a Child]—*Pediatria* 1936 Mar 1 Vol. 14 No. 3 pp. 255-267

The case recorded is that of a child 14 months old in which a diagnosis of kala azar was made both clinically and by the discovery of leishmanias in bone marrow obtained by bone puncture. Complete recovery took place without treatment.

C. M. F.

CARTIA (Giovanni) Due nuovi casi di kala-azar mediterraneo dell'adulto. [Two New Cases of Kala Azar in Adults in Italy]—*Scritti Sierologici Siciliani* 1936 Jan. 15. Vol. 24 No. 2 pp. 82-85-83.

In describing two fresh cases of kala azar in adults in Italy the author gives a list of 59 previously recorded cases in individuals from 15 to 55 years of age.

C. M. F.

FRANCO (Enrico Emilio) Considerazioni su di un caso di kala-azar viscerale autoctone delle Puglie in un medico di 65 anni [Kala Azar in a Medical Man of 65 Years in the Department of Puglia (Italy)]—*Arch. Ital. Sci. Med. Colon.* 1935 Nov Vol. 11 pp. 790-804 [47 refs.]

The case described was somewhat remarkable on account of the age of the patient who was a medical man from Massafra (Taranto). A complete cure followed a course of intravenous injections of neostethione.

C. M. F.

PREU (Jean) Deux kala-azar de l'adulte à évolution chronique. [Two Chronic Cases of Kala Azar]—*Marseille-Med* 1935 Oct 5 Vol. 72 No. 29 pp. 453-463.

These cases have already been referred to in a previous note.¹⁷
Bulletin, 1935, Vol. 33 p. 260.

C. M. F.

BENHAMOU (E.) & FOURÈS (R) À propos d'un nouveau cas de kala azar vérifié par les frottis dermiques. L'ascite leishmanienne. [Another Case of Kala Azar confirmed by Skin Smears Leishmania in Ascitic Fluid.]—*Bull Soc Path Exot* 1935 Oct. 9 Vol. 28. No 8. pp 706-708.

A child 3½ years of age was found by spleen puncture to be suffering from kala azar and was treated with neostibosan. About a year later a relapse appeared to have occurred. This was confirmed by the discovery of leishmania in smears from the skin of the thigh. Leishmania were then found in smears of the skin taken from various parts of the body. Though treatment was followed by general improvement parasites were found in the skin on 15 occasions. Later an attempted spleen puncture yielded only ascitic fluid in which large numbers of leishmania were found. The fluid was re-examined at long intervals and always showed parasites in great abundance an indication of the intensity of the infection in this case

C M W

LEE (C. U.) & CHUNG (H. L.) A Clinical Study of the Early Manifestations of Chinese Kala-Azar—*Chinese Med Jl* 1935 Dec. Vol. 49 No 12. pp 1281-1300 With 7 charts. [19 refs.]

As very little appears to have been written about the early symptoms of kala azar the authors have studied carefully from this point of view 51 proved cases of the disease which were seen within two months of the onset of symptoms. Apart from the fact that children are generally more susceptible than adults and that in them the disease has a severer course there is no evident predisposing factor. The onset is very insidious. It may simulate typhoid fever in this respect or be quite sudden. The early symptoms in order of frequency are fever chills dizziness, headache anorexia cough and sweating. The temperature curve may resemble that of malaria, typhoid fever tuberculosis or undulant fever or it may be quite irregular. Daily double rises of temperature occur frequently but are not invariable. Remissions of symptoms during which the blood, liver and spleen tend to return to normal are characteristic. Within the first few weeks the only detectable abnormality may be fever but a degree of leucopenia develops early while a study of the plasma proteins may show an increase in the globulin and euglobulin fractions. Experience has shown that in the presence of an obscure fever accompanied by a progressing leucopenia the possibility of kala azar must be borne in mind. Repeated examinations may have to be made in such cases before leishmania can be discovered. Acute agranulocytosis may occur occasionally as a serious complication during the early course of kala azar. The early cases respond readily to treatment many becoming completely normal at the end of the fourth or fifth week.

C M W

GIRAUD (P) CIAUDO & BERNARD (R) Variations des protéines sériques au cours de la leishmaniose interne. [Variations in Serum Proteins in the Course of Kala Azar]—*Bull Soc Path Exot* 1935 Dec. 11 Vol. 28. No 10 pp 922-929

The authors have studied the blood serum of 12 human and 4 canine cases of kala azar from the point of view of the protein content at different stages of the disease. The conclusion reached is that during the height of the disease there is a general increase in the total proteins

but a very variable decrease in the albumin so that the albumin-globulin ratio is lowered and often inverted. These modifications are frequently absent or even reversed at the commencement of the disease, while they disappear during the progress of cure resulting from antimony treatment. Though an estimation of the protein content of serum may give a useful indication of cure it cannot be regarded as a procedure of diagnostic value.

C. M. F.

DI BENEDETTO (Vincenzo). La reazione di Henry (nebula e fior di cocciazione) nella diagnosi della malaria e del kala azar. (Henry's Reaction in the Diagnosis of Malaria and Kala Azar).—*Riv. Sanitaria Siciliana* 1935 July 15 & Aug. 1 Vol. II No. 14 & 15 pp. 1063-8, 1069-92, 1095-8 1153-64 1167-74 1173-5. French summary (8 lines).

In this paper the author discusses at some length the reaction of Henry as an aid to the diagnosis of malaria and kala azar. As regards the former disease the test has been made in 150 cases, the results obtained being mostly positive and confirmatory of the claims of the originator of the test. Carried out in 50 cases of kala azar the results have also been almost uniformly positive while they have been negative in 97 per cent. of 100 controls. The conclusion reached is that the reaction is of definite value for the diagnosis of malaria and kala azar. The explanation of the reaction is to be found in the physico-chemical changes in the blood rather than in the presence of specific antibodies.

C. M. F.

GIRAUD (P.) CLAUDE & BERNARD (R.). Valeur de la réaction au pectonate de fer pour le diagnostic de la leishmaniose interne. (The Peptonate of Iron Reaction in Diagnosis of Kala Azar).—*Arch. Soc. Path. Expt.* 1935 Nov. 13. Vol. 28. No. 9. pp. 811-817.

The authors have compared the peptonate of iron reaction with those of ureastibamine and formal and have found that the peptonate of iron when used in a 1/500 solution, gives results which are equal in diagnostic value to those obtained with the other two reagents. Certain irregularities however occur so that to obtain the best results the three tests should be applied. From the results obtained it is possible to state whether kala azar is probably present or not.

C. M. F.

PIRRUGLIA (Rosalino). Ricerche sulla sieroreazione di Auricchio e Chieffi nella leishmaniosi viscerale. (Auricchio and Chieffi's Peptonate of Iron Reaction in Kala Azar).—*Prostetica* 1935 Apr. 1 Vol. 44. No. 4. pp. 235-295.

The serum reaction referred to in the title is Auricchio and Chieffi's modification of the Henry malaria test, in which a solution (1/500) of peptonate of iron is allowed to run on to the surface of the serum to be tested. A positive result is shown by an opalescence developing into a definite flocculation. The author has carried out the test with the serum from 24 cases of infantile kala azar, 35 normal children and 16 suffering from other illnesses. Of the kala azar cases 15 gave a three plus positive reaction and these were cases which either had not commenced or were still undergoing treatment. One case gave a completely negative result, while in 8 the reaction was of a one or two plus intensity. The controls were uniformly negative.

C. M. F.

CHORINE (V) & PRUDHOMME (R. O.) Mécanisme de la réaction au peptonate de fer pour le kala-azar [Mode of Action of the Peptonate of Iron Reaction in Kala Azar].—*C R Soc Biol.* 1936 Vol 121 No 9 pp 831-833

The authors discuss the Auricchio and Chieffi reaction and conclude that as in the Henry reaction it is due solely to the fact that the peptonate of iron increases the concentration of hydrogen ions in the mixture. Precisely the same results are obtained by the use of distilled water instead of peptonate of iron.

C M W

SARKISIAN (A. B.) Zur früh-diagnose von Kala-azar nach dem Blutbild.—*Arb d Tropeninstituts d Volksgesundh Kommissariat d SSR Armenien* 1935 Vol. 2. [In Russian pp 343-344 German summary p 371]

MENOV (T Bhaskara) ANNAMALAI (D R) & KRISHNASWAMI (T K) The Value of the Aldehyde and Stiburea Tests in the Diagnosis of Kala-Azar.—*Jl Trop Med & Hyg* 1936 Apr 15 Vol. 39 No 8. pp 92-95 [15 refs.]

It is concluded that the neostibamine test has the advantage over the aldehyde test in that it can be performed with the quantity of serum obtained from a finger prick and that it gives a positive reaction in a larger percentage of cases. On the other hand a number of positive reactions are given in cases other than kala azar. It is found that both tests are open to fallacies but that these can to some extent be overcome if both are performed together and it is remembered that weak reactions may be misleading. As regard the cases of kala azar tested it is stated that the diagnosis in most instances was a clinical one as spleen puncture is not favoured by the Madras School of physicians. This being so it is open to question as to how accurate or otherwise are the figures brought forward for comparison.

C M W

BENHAMOU (Ed.) & GUILLE (R.) La réaction de Chopra en dehors du kala-azar [Chopra's Reaction in Diseases other than Kala Azar].—*C R Soc Biol.* 1935 Vol. 120 No 40 pp 1261-1262.

Contrary to the generally accepted view the authors have found that a positive ureastibamine reaction occurs quite commonly in malaria and some other diseases. It becomes positive when there is an increase in euglobulin a diminution in the albumin and cholesterol and an increase in the flocculability. Quinine treatment of malarial cases causes a positive reaction to become negative. The reaction is in no way specific for kala azar.

C M W

VAN DEN BRANDEN (F.) Sur la réaction au formol néostibosan et la réaction au sulfarsénol dans le diagnostic des infections leishmanennes. [The Formal-neostibosan and the Sulfarsénol Reactions in the Diagnosis of Leishmanial Infections].—*Ann. Soc Belge de Méd Trop* 1935 Dec. 31 Vol. 15 No 4 pp 569-571

In this note the author records his experience in applying the formal-neostibosan reaction of Nattan Larrier and Grimard Richard to the sera from 42 normal Europeans and 31 normal natives in the Belgian

Congo. The results were entirely negative except for a slight fixation in four cases. Of three hamsters infected with leishmanial only one gave a definitely positive result with the sulfamerol test of Caminopetros.

C. M. F.

ROUSLACROIX CLAUDE & LUMBOZO. À propos des réactions sérologiques de la leishmaniose positives en dehors de celle du kala azar.—*Vaccine Méd. 1938. Jan. 23. Vol. 73. No. 1. p. 114-118.*

A case of endocarditis due to a "strepto-enterococcus" and presenting features of Banti's disease chronic malaria and lab sore was positive according to the serological test employed for the diagnosis of kala azar. The case is brought forward as another instance of the lack of specificity of the serological reactions which indicate merely an involvement of the reticulo-endothelial system.

C. M. F.

MATTAY LARRIER (L.) & DUFOUR (J.). Localisation des Leishmania dans les épithéliums des canaux biliaires normaux et cancéreux.—*Leishmania in Normal and Cancerous Cells of the Bile Ducts. C. R. Soc. Biol. 1938. Vol. 121. No. 1. pp. 13-17. With 2 figs.*

In hamsters infected with *Leishmania donovani* the parasites may occur in the epithelial cells lining the bile tubules. In an animal suffering from epithelioma the parasites were also seen in the epithelium lining the alveoli which had developed from the bile tubules in the tumour itself cells which had become definitely cancerous were less liable to infection than other cells which retained their normal tropism for the parasite. Macrophages in the tumour as in normal tissue were infected.

C. M. F.

MO TEN SAI. Pathologic-Anatomical and Pathologic-Histological Studies of Kala-Azar.—*J. Oriental Med. 1938. Feb. Vol. 1. No. 2. [In Japanese pp. 243-269. With 10 figs. on 2 plates. 35 refs.] English summary pp. 15-18.*

The study of tissues from 5 fatal cases of kala azar in Manchuria has shown that the histological changes are similar to those described for this disease in other endemic foci.

C. M. F.

CHODUKH (N. I.) SORIEV (M. S.) & KEROKOV (N. P.). [The Method of Various Strains of Leishmania.]—*Trans. Inst. Epidemiol. & Microbiol. Tashkent. 1938. Vol. 2. pp. 65-111. [In Russian]*

Working with various strains of *Leishmania* (human and canine) *L. donovani* and *L. tropica* of local (Middle Asia) origin *L. tigris* (Tunis) *L. donovani* (India) *L. tropica* (Baghdad) and *L. brasiliensis* the authors applied the following methods, with the object of testing the relative value for the differential diagnosis of these strains—
 (1) Fermentation of sugars in cultures (2) agglutination (3) immunofluorescence method of absorption of agglutinins (4) Noguchi's method (negative sera) (5) complement fixation (6) cultivation on Nöher's medium (appearance of colonies)

None of these methods proved to be suitable for specific differentiation all of them producing group-reactions, which include both the human and canine strains. The failure to differentiate the leishmanias by the adhesion reaction has been previously recorded by these authors.

C A Hoare

SHEVTCHEKO (F I) & RADZIVILOVSKY (G L.) [Canine Leishmaniasis in the Tashkent Breeding Kennels]—*Trans Inst Epidemiol & Microbiol* Tashkent 1934 Vol. 1 pp 146-149 [In Russian]

The authors give an account of the incidence of leishmaniasis among dogs in the Tashkent breeding kennels. Both the visceral and cutaneous forms occurred while in a number of cases a transition from a localized to a generalized infection took place. These are cited in evidence of the identity of the parasites responsible for both conditions.

C A Hoare

SOFIEV (M S) & SHEVTCHEKO (F I) [On the Identity of the Causative Agents of Cutaneous and Visceral Canine Leishmaniasis]—*Trans Inst Epidemiol & Microbiol* Tashkent 1934 Vol. 1 pp 150-153 [In Russian]

An analysis of previous records of cutaneous leishmaniasis in dogs has led the authors to doubt its independent nature and to regard this condition as a manifestation of generalized leishmaniasis.

Support was lent to this view by observations on a number of cases of canine leishmaniasis in Tashkent. In one of these a skin lesion containing the parasite was found. Eight months after successful treatment of the sore the dog developed all the symptoms of visceral leishmaniasis also confirmed microscopically. In another case a dog suffering from typical visceral leishmaniasis developed cutaneous sores after treatment and after these had also been cured a relapse of the generalized infection occurred. It is concluded that cutaneous leishmaniasis in dogs represents one of the manifestations of generalized leishmaniasis, that the disease having started with a localized lesion may become generalized, and that *vice versa* recovery from a generalized infection may lead to the appearance of localized lesions.

It is assumed that both conditions are due to a variation in the virulence of the same causative organism.

C A Hoare

LESTOGUARD (F) & DONATIEN Un cas autochtone de leishmaniose générale du chien à Toulouse. [Autochthonous Leishmaniasis in a Dog in Toulouse.]—*Bull Soc Path Exot* 1935 Dec. 11 Vol. 28 No 10 pp 921-922.

During a stay in Toulouse the authors took the opportunity of examining for leishmania dogs which were destroyed in the pound. Amongst 12 examined there no case of infection was found. Their attention however was called to an Irish terrier belonging to the municipal dog catcher. It was in good condition but had ulcers about the ears and front feet. Examination of scrapings from the ulcers as

also of smears of bone marrow obtained by tibial trephine revealed leishmania. The dog had spent the whole of its life in the town so that the case was evidently one of autochthonous infection. No other case of infection so far from the Mediterranean coast, where human and canine kala azar is common has been noted. The case forms a connecting link between the Mediterranean endemic centre and those of the Iberian Peninsula.

C. M. F.

MARCONI (F.) CRAINI (F.) & SCAPATICCI (R.). Ricerche sulle variazioni stagionali della leishmaniosi del cani in Roma. [Investigations on the Seasonal Variations of Canine Leishmaniasis in Rome].—Arch. Ital. Sci. Med. Colon. 1933 Nov Vol. B No. 11 pp. 805-812.

This paper appears to be an Italian version of one already published in the *Journal of Tropical Medicine* in English (see this Bulletin, etc., p. 18).

C. M. F.

LEMIRE (P.) & BILFTINGER (F.). Recherche de la leishmaniose viscérale chez les chiens de l'ouvrage d'Athènes. [Leishmaniasis and Dogs in the Pound at Athens].—Bull. Soc. Path. Exot. 1936 Feb 12 Vol. 29 No. 2 pp. 131-133.

The authors have examined for evidence of leishmaniasis amongst 498 stray dogs destroyed at the pound in Athens. Smears of the liver, spleen and bone marrow were searched for parasites in all cases, while in 222 cultures were attempted from the blood or spleen. The result was that 55 cases of canine kala azar were discovered. Parasites were found 50 times in the bone marrow taken from the sternal end of a rib, 42 times in the spleen and 21 times in the liver. Of the cultures 11 were positive and of these two were from cases which had not shown parasites in the smears. Various serological tests were carried out on the blood of the dogs. In the known cases of kala azar the reactions were positive while positive results were obtained also in a number of cases in which leishmania had not been found. If these are to be regarded as cases of latent infection the percentage of infections could be raised from 11.2 to 15.8. It is doubtful, however, if such a conclusion is justifiable.

C. M. F.

POLAKSINTS (A.) SOULIE (P.) & SCANDARAXI (Toufic). Enquête sur la leishmaniose canine à Beyrouth. [Canine Leishmaniasis in Beirut].—J. Egyptian Med. Assoc. 1933 Dec. Vol. 19 No. 12 pp. 773-782.

An examination of 48 dogs in Beirut has revealed a visceral leishmania infection in three. It is noteworthy that the three dogs were pedigree dogs, two of which had been imported from France, and that they came from the centre of the European quarter. Of the dogs tested to have no infection 30 were stray dogs destroyed by the municipal authorities.

C. M. F.

GIRAUD (Paul) CIAUDO (P) & BERNARD (R.) Sur la date d'apparition des réactions sérologiques dans la leishmaniose canine expérimentale. [Time of Appearance of Serum Reactions in Experimental Canine Leishmaniasis.]—*C R. Soc Biol* 1935 Vol. 120 No 40 pp 1250-1252.

Observations on the changes in the serum of two dogs experimentally infected with kala azar indicated that these do not become evident till after the expiry of 3 to 6 months from the date of inoculation. The albumin-globulin ratio reveals at first an increase but this diminishes as the disease progresses. Similarly the formol, ureastibamine sulfarsenol and peptonate of iron reactions became evident after a similar interval and gradually increased in intensity. The ureastibamine and the peptonate of iron reactions were equally reliable while the formol reaction was slightly less so. The sulfarsenol reaction gave most variable and unreliable results.

C M W

HUMPHREYS (R. M.) & MAYNE (F. S.) Oral Leishmaniasis in the Anglo-Egyptian Sudan.—*Trans Roy Soc Trop Med & Hyg* 1935 Nov 25 Vol. 29 No 3 pp 285-288 With 3 figs on 1 plate.

The paper describes 3 cases one British and 2 native of oral leishmaniasis. In one case there were lobulated growths on the hard palate, whole of the soft palate the tonsils inner side of gums of upper jaw and mucosa of the nasopharynx and nares. The liver and spleen were enlarged. Leishmania were discovered in material obtained by puncturing the growths but not in that from the spleen. The British case commenced as purple patches on the gums. The condition developed steadily for 7 years till when seen by one of the authors the floor of the mouth, palate, gums and inner aspect of the cheeks had the appearance of granulation tissue with small ulcers. Smears from a freshly excised portion of the gums showed leishmania. In the third case there was a flat papillomatous growth on the floor of the mouth extending to the lower jaw and on to the buccal mucous membrane. The liver and spleen were both much enlarged. Spleen puncture failed to reveal leishmania which were present in the oral growth. The cases were treated with intravenous injections of tartar emetic or neostibosan. All three cases responded well to treatment though it was necessary to give larger doses and to continue the treatment over a longer period than is necessary for kala azar.

C M IV

KOUSA. Contribution au traitement du bouton d'Alep [On the Treatment of Oriental Sore in Aleppo]—*Jl Egyptian Med Assoc* 1935 Aug Vol. 18. No 8 pp 564-569

The paper reviews the work of the special clinic devoted to oriental sore in Aleppo. Numerous methods of treatment have been employed but at present three are chiefly used. These are the cryo-cautery valuable because of the rapidity of its application, dressing after curetting with a compress soaked in a 25 per cent. solution of iron perchloride and finally intravenous injections of foudadin used when the sores are in such a position that they cannot be dealt with by the other methods. Though oriental sore is very common in Aleppo visceral leishmaniasis does not appear to exist as numerous spleen punctures performed in different hospitals have failed to demonstrate the parasite.

C M IV

SHATTUCK (George Cheever) The Distribution of American Leishmaniasis in Relation to that of Phlebotomus.—*Amer Jl. Trop. Med.* 1936, Mar Vol. 16, No. 2, pp. 187-205. [56 refs.]

This is a very interesting review of the records of American leishmaniasis in various localities, written with special reference to a possible correlation between the distribution of the disease and that of sucking species of the genus *Phlebotomus*. Though the records regarding the sucking species are far from complete it appears that a definite correlation actually exists and it seems probable that all forms of leishmaniasis are transmitted usually by species of *Phlebotomus*. It is possible, however, that the disease may occasionally be transmitted by other vectors and even by direct or indirect contact. It is clear that much more work has to be done on the method of transmission of leishmaniasis in America and the paper under review affords an excellent introduction to the subject.

C. M. F.

BLACKWATER FEVER.

FOR (HENRY) & KONDI (ATHENA) Researches on Blackwater Fever in Greece. I.—Introduction and History II.—A Note on the Action of Ehrlich's Diazo-Reagent on the Unhaemolyzed Serum of the Rabbit. III.—A New Photo-Nephelometric Method for the Quantitative Estimation of Minute Amounts of Quinine in Faeces and Body Fluids.—*Ann Trop Med & Parasit* 1935 Oct. 5 & Dec. 18. Vol 29 Nos. 3 & 4 pp 383-393 [37 refs] 395-397 [15 refs.] 497-515 With 2 graphs & 2 diagrams. [29 refs.]

I. The researches which will form the basis of this series of papers are being undertaken under the aegis of the Health Organisation of the League of Nations.

The first paper deals with the history of blackwater fever in Greece. A certain amount of confusion exists as to the precise interpretation of the Hippocratic cases. Careful examination of the Hippocratic corpus in Greek and of numerous translated texts has led the authors to the opinion that if the cases described by Hippocrates were not blackwater fever then it is very hard to say what they were. It is believed that this is the first attempt to analyse critically the Hippocratic texts with regard to these blackwater fever cases.*

At the present time there appear to be four more or less ill-defined types of haemoglobinuria occurring in Greece some of which can hardly be regarded as falling into the category of blackwater fever as at present understood. One type is the so-called malaria haemoglobinuria (with or without quinine) another is produced by eating beans *Fava vulgaris* a third group consists of quinine-sensitive individuals and lastly there is a certain number of cases of Well's disease. Clinically the first three are indistinguishable from one another and the fourth can only be diagnosed by laboratory methods rarely resorted to in Greece.

Whether these various types of haemoglobinuria were existent when Hippocrates wrote in 450 B.C. is impossible to say though it is highly improbable that the Greeks were familiar with quinine. The fact that the Greeks were unfamiliar with quinine is however hardly an argument against regarding the Hippocratic cases as blackwater.

The authors give a number of representative Hippocratic cases freely translated into English either from the Greek the German, or the French, and checked against the already existing English texts. They remark that it will be seen that the various cases exhibited such characteristic symptoms of blackwater fever as black or red urine, icterus, enlarged spleen vomiting anuria, uraemia, and fever. They then pass to a consideration of subsequent references to the disease in Greek literature. From 450 B.C. until late Byzantine times no reference which could be regarded as relating to blackwater fever is traceable.

*The term black urine (*μελαχτική ωρά*) used in the first book of Hippocrates *Epidemics* is of course very indefinite and the modern term αἷμοφαγόπυρης τοπεῖς or haemoglobinuric fever (*αιμοφαγίην* = haemoglobin) was naturally not known before the microscope could differentiate haemoglobinuria from haematuria.

Topēis might mean any form of fever but from Aristophanes time onwards it was applied to the prevalent fever malaria, and was not used of certain other fevers plague for example.—Ed.]

In the seventh century A.D. however Theophilos Protospatherios mentions black urine and in the twelfth century A.D., Actonius refers to black urine accompanied by fever and icterus. From this period until the middle of the nineteenth century no statements are traceable in Greek that may be regarded as referring to blackwater fever.

In 1842 Navroyanis writes that "one form of malignant intermittent fever is that which affects the bowels, i.e. the bloody or black-bile fever" but whether this is meant to apply to haemoglobinuria seems doubtful.

The first undoubtedly reference to blackwater fever in Greece by a Greek author was in 1858 when Antoniades mentions that a number of Greek doctors have observed that haematuria (haemoglobinuria) is a common symptom of the intermittent fever and follows the administration of quinine.

II Experiments were performed on the unhaemolysed serum of a rabbit with the object of ascertaining the bilirubin level as a guide to the reticulo-endothelial blockade. The authors used the original van den Bergh reaction and also that of Thannhauser and Andersen.

Contrary to the work of LEPENEX (1919) it was found that the serum of normal rabbits contains no bilirubin that reacts with the reagent of Ehrlich, thus confirming Hida, Imanaka and Maeda. How far this is due to smaller amounts present in the serum of rabbits, or to differences in the renal thresholds for this substance, or to factors connected with the reticulo-endothelial system, it is impossible to say.

III These studies were undertaken in an attempt to throw some light on the action of quinine in blackwater fever after blockade of the reticulo-endothelium with thorotrast or electro-colloidal copper (Heyden) on the relation of this blockade to the effectiveness of quinine in clearing the blood of malaria parasites and on the question whether blockade has any effect upon the blood levels and upon the rate of excretion of quinine.

Before any of these problems could be attacked it was necessary to develop some practical means of estimating quinine in blood and urine and if possible in faeces. It also seemed desirable to use some method for ascertaining to what extent the blockade of the reticulo-endothelial system had become effective as otherwise it would be impossible to draw conclusions. Work is progressing on the latter problem and will be recorded later the object of the present paper is to call attention to what the authors believe to be a new method for estimating minute amounts of quinine in 1 cc. of urine (which can also be made applicable to faeces) and to certain improvements which they have introduced into the methods for blood quinine.

Since RAMSDEN and LURKIN (1918) described their laborious method for blood and urine quinine estimation little or no real advance has been made in the study of blood quinine levels and their correlation with the excretion of the alkaloid by the renal and alimentary routes. ACTON and KING (1921) modified RAMSDEN and LURKIN's method and reduced the time and labour necessary to make the estimations, but still left much to be desired, both as to practicability and sensitivity. ROY (1926) increased the sensitivity of the colorimetric methods by introducing a modified Wagner's reagent indicator for blood quinine and later VENDLER and MASER (1931) still further improved the colorimetric method by introducing gum-ghatti and a potassium bromate iodide indicator claiming that the gum-ghatti stabilized the colour of

their indicator and that with this indicator the large number of standards necessary for use with Roy's reagent were unnecessary. The authors however reached the conclusion that the instability of the colour in both these colorimetric methods renders them worthless. In view of this they decided to modify VEDDER and MASSEN's (1931) nephelometric method for blood quinine.

The sensitivity and accuracy of the method developed by the authors for the estimation of quinine in urine is as is shown from their results all that can be desired. It is impossible in a summary of moderate length to describe the authors' method in an adequate manner and the paper must be consulted in the original by those interested.

The following summary is given by the authors —

1 A new photo-nephelometric method is described for the quantitative estimation of minute amounts of quinine in faeces and body fluids which is accurate and sensitive to 0.5 mg per litre

2 The use of a new photo-nephelometer for use with a standardized turbidity prism is briefly described

3 Variations in the amount of quinine excreted in the urine after similar doses are noted

4 Large quantities of quinine were found to be frequently excreted in the faeces

5 The discrepancy between the amount of quinine absorbed as shown by the urine level and blood quinine level, is noted.

W. Yorke

REYNTJENS La fièvre bilieuse hémoglobinique et l'enfance noire.
[Blackwater Fever and the Black Child.]—*Bull Med du Katanga*
1935 Vol. 12. No 4 pp 141-143-147

Under normal conditions the black child especially during its first year of life escapes blackwater fever although it frequently dies of malaria. When however it is protected against the effects of malaria by quinization it becomes susceptible to blackwater. This is illustrated by two cases which came under the author's observation.

The first case was that of a Baluba (Kasongo) child born on 20th August 1934. It was a splendid specimen and doubled its weight in 3 months. It was taken twice weekly to the clinic and given 0.13 gm of quinine at each visit. The child remained apparently quite well until 1st April 1935 when 72 hours after the last dose of quinine and after a cold and wet journey it was brought to hospital in a comatose state the blood contained malaria parasites and the urine haemoglobin. Death supervened within 12 hours.

The second case was that of a Babemba (Fort Rosebery) child born on 4th August 1934. It was healthy and doubled its weight in 2½ months. It was given 0.13 gm. of quinine twice weekly except during the 4th and 5th months. On 1st April 1935 it developed haematuria [sic] although it had not taken quinine during the previous 6 days. On admission to hospital the blood contained many parasites and the temperature was 39.3°C. Atebrin and plasmoquine were given and the cure was rapid. On 3rd June there was a relapse the blood containing numerous gametes. Quinine 0.25 gm and plasmoquine were given and 2 hours later haemoglobin appeared in the urine and death occurred 6 hours later.

The author draws attention to the fact that these two patients developed blackwater fever on the same day viz 1st April, 1935 and that on the 3rd June when the second case relapsed a young man was

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In 1842 Mavroyanis writes that "one form of malignant intermittent fever is that which affects the bowels, i.e., the bloody or black-bile fever but whether this is meant to apply to haemoglobinuria seems doubtful."

The first undoubted reference to blackwater fever in Greece by a Greek author was in 1858 when Antoniades mentions that a number of Greek doctors have observed that haematuria (haemoglobinuria) is a common symptom of the intermittent fever and follows the administration of quinine.

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Contrary to the work of LERZENEK (1919) it was found that the sera of normal rabbits contains no bilirubin that reacts with the diazo reagent of Ehrlich, thus confirming Hida, Yamamoto and Maeda. How far this is due to smaller amounts present in the serum of rabbits, or to differences in the renal thresholds for bilirubin substance or to factors connected with the reticulo-endothelial system, is impossible to say.

III These studies were undertaken in order to throw light on the action of quinine in blackwater fever, the blockade of the reticulo-endothelium with thorotrast or electro-catalytic copper (Heyden), on the relation of this blockade to the effectiveness of quinine in clearing the blood of malaria parasites, and on the question whether blockade has any effect upon the blood levels and upon the rate of excretion of quinine.

Before any of these problems could be attacked it was necessary to develop some practical means of estimating quinine in blood and urine and if possible in faeces. It also seemed desirable to use a method for ascertaining to what extent the blockade of the reticulo-endothelial system had become effective, as otherwise it would be impossible draw conclusions. Work is progressing on the latter problem and will be recorded later. The object of the present paper is to call attention to what the authors believe to be a new method for estimating small amounts of quinine in 1 cc. of urine, to faeces, and to certain improvements in the methods for blood quinine.

Since RAMSDEN and LIPKIN (1918) described a method for blood and urine quinine estimation, much work has been made in the study of blood quinine with the excretion of the alkaloid by the ACTON and KINO (1921) modified R. Since ROY (1926) increased the sensitivity of the method by introducing a modified Wagner's reagent and later VEDDER and MARX (1931) introduced a colorimetric method by introducing gum-ghatti iodide indicator, claiming that the gum-ghatti

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have steadily increased, references to bacteriological investigations have diminished. This is probably due to the fact that there appears to be a steadily increasing consensus of opinion that blackwater fever is not due to a specific organism in addition to the malaria parasite. In the comparatively few instances in which blood cultures have been carried out the majority proved sterile. STEPHENS and CHRISTOPHERS (1900) however recorded the presence of staphylococcus in heart and liver cultures made at an autopsy in a case of blackwater fever and CRICHLow (1929) referred to the occurrence of staphylococcus-like organisms in the blood. Practically no bacteriological data are available regarding the urine in blackwater fever.

The authors' attention was first drawn to the presence of bacteria in the urine of blackwater fever patients in 1924 when, for the purpose of making certain observations on haemolysis they wished to carry out experiments with sterile blackwater urine. Specimens of urine were obtained aseptically from a case of blackwater fever but on each occasion staphylococci were present. Under the impression that the organism was probably a contamination from the air or skin a catheter specimen was taken with all possible precautions. This also yielded a pure culture of staphylococcus.

This paper records the results of the examination of as many active and recovered cases of blackwater fever as have been recently encountered. Specimens were taken with proper aseptic precautions from 7 cases during or within a few days of the haemolysis. Cultures were also made from the urines of 13 recovered patients 12 of whom contracted their blackwater fever in West Africa and most of whom gave a history of several years freedom from the disease prior to the examination. For the purpose of control the urine of 20 Europeans who had been in Sierra Leone for two years or more were examined and also those of 24 West African natives none of the controls was under treatment for any genito-urinary infection. No anaerobic cultures were carried out although the authors are of opinion that this line of investigation might yield interesting results.

The method adopted for obtaining specimens of urine from the male as aseptically as possible was as follows —

The glans and meatus were carefully washed up with sterile soap and water followed by a wash with absolute alcohol and having discarded the first flow of urine specimens were collected directly into two or more broth tubes. We are of the opinion that this method is generally more satisfactory than the passing of a catheter and it was usually adopted but in the case of females, natives and some patients in the active stage of black water it was found necessary to pass a catheter after the preliminary washing-up just described. At the beginning of this investigation, primary cultures were obtained by taking samples of about 5 c.cm. urine into 20 c.cm. liver broth but later nutrient broth was substituted as it was found that the majority of the various organisms grew with equal regularity on this medium. The centrifuged deposit was never employed for cultural investigation. The broth and urine mixture was kept at 37°C. for four days at the end of which time, if no growth was observed sterility was confirmed by plating on nutrient agar. The usual bacteriological technique was followed for the isolation and identification of the organisms and the results obtained are recorded in the Appendix.

The authors give the following summary and conclusion of their work —

In 7 cases of blackwater fever examined during the active stage of the disease all 7 were found to be excreting organisms in their urine. Amongst

sodium chloride. Isotonic solutions of quinine hydrochloride containing respectively 8 per cent., 6 per cent., 4 per cent. and 2 per cent. of quinine HCl were likewise prepared. The laked red cell solution was injected into the marginal ear of a rabbit in a dose of 4 cc. per kilo of body weight and at the same time 1 cc. per kilo of one of the quinine solutions was injected into the portal vein.

When the concentration of the quinine solution was 6 or 8 per cent. the amount of haemoglobin excreted in the urine markedly exceeded the amount injected but this was not the case with the lower concentrations of quinine. If the reticulo-endothelial system was blocked the amount of haemoglobinaemia was still further increased.

It is concluded that the genesis of blackwater is as follows —

Malaria causes a breakdown of erythrocytes in the blood and the products of disintegration lead to a further destruction of red cells on administration of quinine. The process is aided by the fact that the melanin and haemosiderin associated with malaria are deposited in the reticulo-endothelium and cause a paralysis and blockade of the functions of this system. [Even if the experimental facts described above are correct it is very doubtful if the explanation of the production of blackwater is adequate. There is no evidence that the reticulo-endothelial system is paralysed by the chronic malaria which hitherto precedes blackwater. All the evidence points in the other direction, i.e., that it is in a state of proliferation and hyperactivity.]

5. Experiments were undertaken to investigate the basis of the reputed beneficial effect of the intravenous injections of glucose solutions in blackwater fever.

The author repeated the *in vitro* experiments of Kondo and was able to confirm that glucose possesses the power of inhibitory action on the haemolysis of red cells by quinine. He then extended his investigations to animal experiments and was able to show that the injection of 10 cc. of a 5.4 per cent. solution of glucose per kilo. of body weight caused a diminution in the amount of haemoglobinaemia produced by experiments of the kind described in the previous paper.

From this it is concluded that the efficacy of glucose as a therapeutic agent in blackwater depends upon the fact that it has an inhibitory action on the haemolysis of red cells by quinine. W.Y.

BRDELMANN (G.) & KRÄTEL (G.) Zur Frage der paradoxen Chinkinwirkung [The Question of the Paradoxical Action of Quinine]. *Arch. f. klin. Med.* 1906, Feb. 15, Vol. 15, No. 7, pp. 225-237. With 2 figs. 18 refs.]

Quinine usually causes a fall in temperature and this is specially marked in pyrexial cases. The fall is supposed to be due to a lowering of the chemical energy of the protoplasm of all cells. Occasionally however the administration of quinine is followed by an increase of temperature, and the cause of this paradox is unknown.

Details are given of a patient (mitral stenosis and hyperthyroidism) in whom the administration of chinkin was attended by a rise of temperature two hours later. Altogether the patient was given 4 doses, each of 0.1 gm., of chinkin, and on each occasion there was a rise of temperature to 40 C. and a rigor. It is recorded that Dr. M. T. obtained this paradoxical reaction in two cases of Basedow's disease.

It occurred to the authors that the rise of temperature might be due to a haemolytic action of the chinkin, and accordingly they sought for evidence of this. No trace of haemoglobin was, however, found in the

urine. Attempts were then made to produce evidence of quinine haemolysis through investigations of the patient's serum—the red cells of the patient showed a perfectly normal resistance to hypotonic saline. Experiments were performed with the aid of a Pulfrich's refractometer. Immediately after mixing quinine 0.4 gm. normal saline 10.0 gm. and whole blood 60 cc. the refractometer value was 54 two hours later it had risen to 59.5 and the serum was deeply stained with haemoglobin. Observations were next made on the patient himself before and at various intervals after the administration of 0.1 gm. of chunidin. Before the administration of the drug the refractometer value was 52, and afterwards it rose to 56 the temperature rose from 36°C. to 39.5°C. The rise in the refractometer value preceded the rise of temperature.

The authors are of opinion that they have produced some evidence that the rise of temperature which occasionally follows the administration of quinine is due to a quinine haemolysis. W Y

CHOPRA (R. N.) SEN (B.) & BHATTACHARYA (S. N.) A Case of Quinine Haemoglobinuria.—*Indian Med. Gaz.* 1935 Aug Vol. 70 No 8 pp 453-454

The patient a girl of 11 was admitted to hospital with a history of repeated attacks of malaria and occasional attacks of blackwater. The patient was anaemic the spleen and liver were enlarged but there was no fever. Six weeks before admission she had an attack of blackwater 4 hours after a dose of quinine. Three weeks later she again had an attack of malaria, and although no quinine was given she passed black-coloured urine this lasted for a week and then subsided. The girl was then sent to hospital for investigation and treatment. Microscopic examinations of the blood and faeces were negative the urine contained no haemoglobin but gave a definite urobilin reaction. Other examinations of the blood showed (a) increased fragility of the red cells (b) reduction in the electric charge of the corpuscles, (c) diminution in serum albumen but increase in the euglobulin pseudo-globulin, cholesterol and calcium contents.

In order to see whether quinine had any effect in bringing about haemoglobinuria, 6 grams in two equal doses were given by the mouth on 16th January. Blackwater was passed shortly afterwards but was not accompanied by fever or general symptoms. On 30th January three doses of atebrin each of 0.1 gm. were given and on 1st February the same dose of atebrin with 0.0099 gm. of plasmoquine. The urine remained normal. On 5th February 6 grams of quinine failed to produce blackwater but on 10th February 3 doses of quinine each of 3 grams were followed by a short attack of haemoglobinuria. W Y

BJORN HANSEN (Haakon) Ueber die paroxysmale Kälte-hämoglobinurie Mit besonderer Hinblick auf die leukozytären Blutveränderungen die Hämolysen und den Blutdruck im Anschluss an experimentelle Abkühlungsversuche [Paroxysmal Haemoglobinuria. With Special Reference to the Leucocyte Changes, the Haemolysis, and the Blood Pressure in the Course of Experimental Cooling Experiments]—*Acta Med. Scandinavica.* 1936. Vol. 88. No 2-4 pp 129-179 With 6 charts & 2 figs. [51 refs.]

Four patients suffering from paroxysmal haemoglobinuria were studied in considerable detail during attacks produced experimentally by cooling

All patients exhibited a leucopenia within 10 to 15 minutes; this was independent of any general paroxysm or of the passage of haemoglobinuria. The lowest leucocyte count e.g., a fall from 10,000 to 2,100 or from 10,100 to 6,500 was observed about 20 minutes after the commencement of the cooling; the leucopenia lasted some hours or only 20 to 30 minutes and then the number of leucocytes rose and returned to normal or even rose beyond this value. Sometimes the leucocyte formula was unchanged and at others there was a relative neutropenia. Often there was a shift of the Ameth count to the left. In some experiments the eosinophil leucocytes disappeared completely from the blood. The leucocytosis which sometimes followed the leucopenia was due to an increase in the neutrophils, which in part consisted of young cells.

When a tourniquet was applied to the arm and the limb cooled it 3°C for 6 mins. and then warmed at 38°C, for 15 mins., the blood showed besides the haemolysis described by EASTICK a pronounced leucocytolysis. The number of leucocytes varied from 6,100 to 10,500 and sometimes the disintegration had proceeded to such an extent that it was impossible to differentiate the cells one from another. The leucocytes in the general circulation were unchanged, but within 20 minutes after the tourniquet was removed there was found to be a distinct leucopenia and a pronounced phagocytosis of haemolysed red cells. *In vitro* experiments with coagulated or citrated blood produced a similar leucocytolysis. The arm immersion experiments were nearly quickly followed by a typical paroxysm, i.e., albuminuria, haemoglobinuria and a rigor. Stress is laid on the fact that nothing happened until the tourniquet was removed and the cooled blood allowed to flow into the general circulation.

The author's experiments supported the teaching of LICHSTEIN as far as a definite haemoglobinæmia always appeared some time before the paroxysm but they also showed that, in addition to the haemolysis there was a leucocytolysis and that this also probably played an important part in the production of the general symptoms. Various authors, e.g. WINST, SALIS etc. have shown that in paroxysmal haemoglobinuria there may be a marked paroxysm associated with leucopenia, but without haemoglobinæmia.

W.Y.

MARSHALL (Fred). Hämoglobinurie und Nierenveränderungen bei Bartonellenanämie entmilitärter Ratten und bei Affenmalaria in ihrer Beziehung zum menschlichen Schwarzwasserfeier [Haemoglobinuria and Renal Changes in the Bartonella Anemia of Splenectomized Rats and in Monkey Malaria in Relationship to Human Blackwater Fever].—*Arch. f. Schiffs- u. Trop. Hyg.* 1936 Apr Vol 40 No 4 pp. 151-160 With 4 figs. [16 refs.]

Nine of 14 splenectomized rats suffering from an acute *Bartonella* infection exhibited haemoglobinuria. The renal changes found in these rats coincide with those found in monkeys infected with *P. knowlesi*. In both cases the kidneys exhibited more or less severe epithelial degeneration depending upon the degree of haemoglobinuria. A full description of these lesions is given and the appearances are illustrated in 4 microphotographs. They seem to resemble very closely those found in blackwater fever in man.

The general conclusion reached is that this work furnishes additional evidence that the site of haemolysis in blackwater fever is not the

kidneys but the circulating blood. The haemoglobin in the plasma is excreted through the epithelium of the convoluted tubules. [This view was put forward by the reviewer nearly 30 years ago as the result of his experimental investigations on the excretion of haemoglobin by rabbits injected intravenously with solutions of their own haemoglobin.]

W Y

PONDER (Eric) & ABELS (Julius C.) Effect of Quinine Hydrochloride on Resistance of Rabbit Red Cells.—*Proc Soc Experim Biol & Med* 1936. Mar Vol. 34 No 2 pp 162-165

The purpose of this paper is to show that red cells of rabbits receiving quinine HCl in proper amount are less resistant to lysins such as saponin and sodium taurocholate used *in vitro*. The experiments fall into two groups—(a) *in vitro* experiments, which show that quinine HCl is a simple haemolysin, and (b) *in vivo* experiments which show that the resistance of the animal's red cells is lessened by the administration of the quinine salt.

In vitro experiments—The addition of quinine HCl to systems containing saponin or sodium taurocholate produces a marked acceleration of haemolysis and this can be measured by the usual methods (Ponder 1934). If the red cells are left in contact with 1:100 quinine HCl for 10 minutes (after which time there is no haemolysis) and then washed and re-suspended, the resulting suspension has a smaller resistance to saponin or taurocholate than has an untreated suspension. The authors' explanation of the phenomenon is that the quinine salt combines with some component of the cell membrane transforming it sufficiently to bring about haemolysis if the concentration of the quinine is great, and transforming it partially, but sufficiently to decrease its resistance to a subsequently added lysin if the concentration of quinine is less.

In vivo experiments—In these quinine HCl was given to rabbits in varying dosage and over various periods and the resistance of the animals' red cells to saponin and to taurocholate was measured at intervals. The experiments are described and the results shown in tables. It was found that successive administrations of quinine HCl bring about a decreased resistance of the red cells to saponin and to taurocholate used *in vitro*. The fall of the red cells and the increase of reticulocytes which occur in the blood of animals dosed with suitable amounts of quinine HCl is probably due to an intravascular lysis brought about by intravascular lysins present in the blood stream (*e.g.* bile salts and the unidentified lysins of urine) the action of which is accelerated by the quinine. It is unlikely that the quinine salt itself produces intravascular lysis because a sufficient concentration is never reached in the blood stream.

W Y

KRISHNAN (K. V.) GHOSH (B M) & BOSE (P N) Cholesterol Changes in Monkey Malaria and Haemoglobinuria.—*Records of the Malaria Survey of India* 1936. Mar Vol. 6. No 1 pp 1-12 With 1 chart. [25 refs.]

The cholesterol content of the blood of man suffering from malaria and blackwater fever has frequently been studied. As a rule a hypocholesterinaemia has been recorded but occasionally no change from

All patients exhibited a leucopenia within 10 to 15 minutes this was independent of any general paroxysm or of the passage of haemoglobinuria. The lowest leucocyte count e.g., a fall from 10,000 to 2,100 or from 10,100 to 6,500 was observed about 20 minutes after the commencement of the cooling the leucopenia lasted some hours only 20 to 30 minutes, and then the number of leucocytes rose and returned to normal or even rose beyond this value. Sometimes the leucocyte formula was unchanged and at others there was a relative neutropenia. Often there was a shift of the Arnett count to the left. In some experiments the eosinophil leucocytes disappeared completely from the blood. The leucocytosis which sometimes followed the leucopenia was due to an increase in the neutrophils which in part consisted of young cells.

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The author's experiments supported the teaching of LICHENSKIOLD that as far as a definite haemoglobinuria always appeared some time before the paroxysm but they also showed that, in addition to the haemolysis there was a leucocytolysis and that this also probably played an important part in the production of the general symptoms. Various authors, e.g. VIDAL, SALIX etc. have shown that in paroxysmal haemoglobinuria there may be a marked paroxysm associated with leucopenia, but without haemoglobinuria.

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The general conclusion reached is that this work furnishes additional evidence that the site of haemolysis in blackwater fever is not the

the disappearance of the condition. The values obtained when haemoglobinuria disappeared were 100 150 170 180 and 200. Cholesterol is capable of exerting an inhibiting influence on haemolysis and haemoglobinuria resulting from intense malarial infection in monkeys. W Y

OTTO (I H.) Zur Behandlung des Schwarzwasserfebers mit Campolon. Nach H. E. Naumann. [The Treatment of Blackwater Fever by Campolon.]—*Arch f Schiffs u Trop Hyg* 1935 Oct. Vol. 39 No 10 pp 422-425 [10 refs.]

Details are given of two cases of blackwater treated with large doses of campolon both patients made a speedy recovery. The author lays stress on the fact that he gave his patients campolon alone and not together with glucose and insulin as recommended by Naumann [this Bulletin 1935 Vol. 32 p 200]. Blood regeneration was rapid in one of the patients the red cell count rose from 1,980,000 to 4,700,000 and the haemoglobin value from 45 per cent. to 79 per cent. within 18 days

W Y

NAUMANN (H. E.) Schwarzwasserfeber Behandlung [The Treatment of Blackwater Fever]—*Arch f Schiffs u Trop Hyg* 1936 Feb Vol. 40 No 2. pp 73-76

Details are given of 10 cases of blackwater fever treated with atebrin and campolon injections since all recovered the author believes that this is the treatment of choice.

In reaching a decision upon the proper treatment of this disease the author states that he kept four points in mind viz.—(1) Malaria (2) damage to the red cells (3) damage to the liver and (4) blockade of the renal tubules. The last of these is without doubt a secondary phenomenon and therefore for the present purpose can be neglected. The first factor is treated with atebrin alone thereby eliminating the unpleasant consequences of quinine and plasmoquine and the second by large doses of campolon. Great importance is attached to bolstering up the liver function and the author is now inclined to omit the insulin and glucose previously used by him [this Bulletin 1935 Vol. 32 p 200] and to rely solely upon campolon which besides being a powerful stimulant of the haematopoietic system exerts a specific action upon the liver function. W Y

HAUER (August) Beitrag zur Behandlung des Schwarzwasserfebers. [The Treatment of Blackwater Fever]—*Arch f Schiffs u Trop Hyg* 1936 Feb Vol. 40 No 2. pp 76-81

A detailed account is given of a case of blackwater fever treated successfully with intravenous injections of calrose strophanthin and insulin and with intramuscular injections of campolon. Although the general result of this treatment is said to have been excellent stress is laid on the fact that vomiting continued for 36 hours necessitating the hourly administration of chloroform water. The author discusses the relative value of intramuscular and intravenous injections of liver extract. He considers that the intramuscular injection leads to the formation of a depot which is utilized with different speeds by different individuals. When the material is given intravenously its action is much quicker. In severe forms of anaemia due to chronic sepsis the author has found that the intravenous injection of 20 cc. of

"Hepatrat ad infusionem" is well tolerated. He emphasises the fact that the forms of liver extract usually employed for intramuscular injection are not suitable for intravenous administration because they contain certain substances which act on the circulation and may produce the most dangerous shock. The ordinary preparations of liver extract contain small quantities of histamine, but only those which are entirely free from this substance are suitable for intravenous use. He arranges the various liver extracts according to their content of substances acting on the circulation as follows—hepatopson 15 campolon 25 pernamiyl 45 hepatrat 5 and hepatrat ad infusionem 0.

Details are also given of a patient with malaria, who whilst improving under a course of atebrin and plasmoquine, was given three applications of short ultra violet rays because of his enormously enlarged spleen. The radiation appeared to be associated with a definite deterioration of the patient's condition. The spleen decreased considerably in size but the patient complained of pain in the splenic area, and there was a very considerable fall in the red cell count and haemoglobin value.

II Y

CORMAN (A.) La atebine et les extraits hépatiques dans le traitement de la fièvre bilieuse hémoglobiniante (dix observations personnelles) [Atebrin and Liver Extract in the Treatment of Blackwater].—*Bull. Acad. Malgache* 1935 Vol. 12 No. 3 pp. 91-95-101 103-108.

Details are given of ten cases of blackwater fever treated with atebrin and liver extract (campolon). It is noted that 8 of these cases had taken prophylactic quinine regularly prior to the onset of blackwater. Only one of the patients treated in this way died, as compared with 7 deaths among the 13 cases treated by other methods previously. All evidence of haemolysis had disappeared within 4 days and the rapidity with which the blood regenerated was striking.

II Y

DANG-HANH KIEN Contribution au traitement de la fièvre bilieuse hémoglobiniante par les injections d'urotropine. [The Treatment of Blackwater Fever by Urotropine].—*Bull. Acad. Malgache* 1935 Oct. 15 98th Year 3rd Ser Vol. 114 No. 2 pp. 282-288.

Details are given of 8 cases of blackwater fever treated by urotropine all recovered. The author states that, in his opinion urotropine is not without action in this disease but how it acts he does not know.

[The reviewer is quite prepared to admit the truth of the last portion of this sentence but he is not so certain about the first portion.]

II Y

MOSTERT (H. & R.) Observation on Quinine Prophylaxis and Blackwater Fever in Central Africa.—*South African Med. J.* 1935 Dec. 14. Vol. 9 No. 23. pp. 827-832 With 1 chart. [In refa.]

The value of quinine as a prophylactic against malaria is a matter of paramount importance but unfortunately one that has been the cause of much controversy in recent years. WATSON in Malaya and Russia in the Philippines hold that the drug as a prophylactic has been a failure, whilst in the opposite camp are many experienced workers.

The experimental work of YORKE and MACFIE [this *Bulletin* 1925 Vol. 22, p. 50] has shown that in artificially induced malaria quinine is not a true prophylactic. The author doubts however whether conclusions drawn from such experiments can be accepted as conclusive proof that the drug is useless as a prophylactic in the malarious areas of Central Africa.

Apparently different strains of *P. falciparum* vary in their sensitivity to quinine and it may not be necessary for effective prophylaxis that the sporozoites must be destroyed, the regular taking of quinine may be sufficient to eradicate any trophozoites resulting from periodic infections. The crucial test is whether those physicians working in the highly malarious regions of Central Africa have found the regular taking of small doses of quinine a protection or not against the disease.

The author's experience at the Nchanga Copper Mine in Northern Rhodesia is that prophylactic quinine has been an economic success and has enabled the bulk of the staff to give the maximum of useful labour to the Company. Of the 230 cases of malaria which have occurred among the European staff and dependants during the years 1929-1932 only 8 per cent. were regular quinine takers and 92 per cent. were either irregular takers or non takers. Whether small regular doses of quinine render the blood completely free of parasites or merely repress the disease until such time as the health is below par is an important question. [It is but the author does not seem able to throw any light on it.]

Mosert next passes to consider how far it is possible to dispense with quinine and rely purely on hygienic measures in a controlled area. His own experience at Nchanga taught him that in addition to sanitary measures the prophylactic use of quinine was indispensable.

Writing on the dangers other than malaria associated with the non-taking or irregular taking of quinine Mosert says that in the Rhodian copper fields the recurrent attacks of malaria which inevitably resulted in those who neglected to take their quinine regularly were often responsible for two serious complications viz abortion in pregnant women and blackwater fever. A summary is given of 32 cases of blackwater fever treated by the author. All give more or less the same history of not taking quinine or of taking it irregularly in the intervals between their bouts of fever.

The paper closes with some remarks on the treatment of blackwater fever.

W Y

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CORRIAN (A.) L'atébrine et les extraits hépatiques dans le traitement de la fièvre hémisomique hémoglobinoquine (dix observations personnelles) [Atabrin and Liver Extract in the Treatment of Black-water].—*Bull. Acad. de Malacca* 1935 Vol. 12 No. 3 pp. 83-85-101 103-108.

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The value of quinine as a prophylactic against malaria is a matter of paramount importance, but unfortunately one that has been the cause of much controversy in recent years. Watson in Malaya and Russell in the Philippines hold that the drug as a prophylactic has been a failure, whilst in the opposite camp are many experienced workers.

KABLER (Paul) Incidence of Infection with Intestinal Protozoa in Minnesota.—*Amer Jl Med Sci* 1935 July Vol. 190 No 1 pp 103-106. [14 refs.]

The examination was conducted on 146 healthy working food handlers of a large railway system. Each individual was examined after the administration of a saline cathartic on one occasion only. One or more of all the common intestinal protozoa were found in 24·67 per cent. *Entamoeba histolytica* giving the low figure of 1·37 per cent.

C M W

CONNELL (Frank H.) Amebiasis in a Rural Community.—*New England Jl of Med* 1935 Oct. 17 Vol. 213 No 16 pp 748-750

The author undertook the examination of faeces of 700 students, freshmen at Dartmouth University New Hampshire U.S.A. The subjects came from various parts of the States and were apparently in good health. The examination has not yet been completed but so far he has found six to be infected with *E. histolytica* and 14 were passing *Giardia lamblia*. Among 63 townspeople examined at the laboratory during the past 3 years there were none with *E. histolytica* and only 2 with *Giardia*. The proportion is almost certainly greater than the former figures would indicate for by faecal examination only and particularly when the number of specimens is limited (in these persons to two each) others would be missed. All those found to be cyst passers in the college group were given carbarsonic 0·25 gm. twice a day with grain 1/2 of emetic for 10 days. This treatment produced stools that were free from cysts and amoebae and have continued to remain free.

H H S

AUSTIN (T. A.) & MAYNE (L. C.) A Review of the Incidence of Amoebiasis in Zomba, with Special Reference to European Cases.—*Nyasaland Protectorate Ann. Med & San Rep for Year ending 31st December 1934* Appendix III pp 73-82

Dysentery has been recorded in Nyasaland in Annual Reports for nearly a quarter of a century but proper scientific investigation regarding the prevalence has only recently been undertaken. SHELLY in 1932-33 examined the faeces of 1123 residents of Zomba 279 Europeans and 844 Africans and found 21·8 per cent. of the former and 3·5 per cent. of the latter to be infected with *E. histolytica*. In 1932 twelve cases were reported, in 1933 twenty two (6 in December) and in 1934 thirty three (14 in December); more in the early part of the rainy season when flies are abundant. In Zomba, Nyasaland the rainy season extends from November to April and is heaviest in January and February. Native servants live in compounds surrounding the European residences. The water supply is now a pipe-borne gravity supply. Food is abundant and varied but vegetables are not regarded as safe from contamination unless their place of growth is known (e.g. small vegetable gardens of European residents). In March and April 1934 427 faecal specimens from house servants of Europeans were examined (fifteen householders were so short sighted as to refuse any examination) and 7 contained *E. histolytica*. During the last 9 months of 1934 405 prisoners were examined, one was passing *E. histolytica* and

40 were cyst passers and in 9 of 87 specimens from inmates of the Central Lunatic Asylum the cysts were found.

Disposal of night soil in Zomba is not satisfactory and flies are numerous. Rectification of the sewage disposal, cutting down banana groves where promiscuous defaecation occurs and of mango trees, a source of decaying papabulum for flies, will do much to eliminate the fly nuisance.

There are three clinical types of amoebiasis in Zomba—acute dysentery, diarrhoea and abdominal discomfort, and amoebic hepatitis. With few exceptions the disease is of a mild type. Infection is far too rare in children. 11 cases were recorded under the age of ten years in 1934-1935 in 54 weeks and in them the onset is more severe than in adults with higher fever and sometimes with vomiting.

The best treatment has been found to be a combination of emetic hydrochloride injections intramuscularly, 1 grain daily for 8-10 days and a daily enema of 200 cc. of a 1 per cent. solution of quinacrine. Emetine periodide was tried but was badly tolerated and discontinued. To children emetine was not given but $\frac{1}{4}$ tablet [strength not stated] of quinacrine thrice daily by mouth for 10 days and 0.5-1.0 per cent. quinacrine enemas.

H. H. S.

AUSTIN (T. A.) & MATTHEW (L. C.). A Review of the Incidence of Amoebiasis in Zomba, with Special Reference to European Cases.—*East African Med J.* 1935, June, Vol. 12, No. 3, pp. 68-81.

Dysentery has probably been endemic in Nyasaland for a long time. More than a quarter of a century ago the Medical Officer of Zomba remarked that dysentery was one of the principal diseases among Europeans. Not till ten years ago however was any distinction made in the Annual Report between the different types of dysentery. Coming to more recent times, in 1933 Dr H. M. STRELLEY examined 279 specimens of faeces from Europeans and 844 from Africans and found the amoeba in 21.8 per cent. of the former and 3.5 per cent. of the latter [see also this Bulletin 1934 Vol. 31 Supp. p. 58]. European cases of amoebic dysentery in Zomba have increased in the last three years, the figures being 12, 22, and 33 respectively. The infection is more prevalent in the rainy season most cases being reported in December. Though not definitely recorded as occurring among children, until 1933 the fact that certain cases of so-called enteritis in children were at houses where one or other parent had suffered from dysentery is at least suggestive. During 54 weeks from January 1st, 1934 eleven cases were reported in children under 10 years. The prevalence of flies and the general state of sanitation (or absence of it especially among native women and children) were certainly favourable to the multiplication of vectors and spread of infection. Now that improved methods of sanitation have been introduced there is every probability of a marked reduction in the number of cases in the future. [See preceding article for other details.]

H. H. S.

ALEXANDER (Frank D.) & McLELLAN (Henry E.). A Study of Diet in Two Rural Communities in Tennessee in which Amoebiasis was prevalent.—*Amer Jl Hyg* 1935, Nov, Vol. 22, No. 3, pp. 704-730. [22 refs.]

A survey of the diets in one community (Hatchie) where acute amoebic dysentery was common and in another (New Hope) where it

was very rare although 40 per cent. harboured *E. histolytica* was made. Hatchie is situated in the plains and contains whites and negroes. New Hope in the hills and contains whites only. New Hope households consumed diets superior to those of Hatchie in the following respects — variety of major foods consumption of sweet milk, fruits and green vegetables caloric intake vitamins A, B₁, B₂, C and D intake. In both communities protein intake was at a standard level but the fat intake was below standard (24 per cent.—standard 36). There were wide variations in the number of foods used by individual households (from 10 to more than 30). In general the whites of Hatchie fared better than the negroes. None of the negro households used foods containing adequate amounts of vitamin D. A comparison of the winter and summer foods showed that the principal articles of food were essentially the same. There was no definite difference in the physique (height weight age-ratio) of the two communities and no correlation was found between caloric consumption and under or over weight. No correlation was found between dietary inadequacies and harbouring of *E. histolytica* in individual households. It is interesting however that in New Hope where milk, greens and fruit were more abundantly eaten, the amoebae obtained were less pathogenic for kittens than strains from Hatchie. No clinical studies were made to determine whether any deficiency diseases existed. The large amount of corn meal used by both communities was the most striking common feature of the diets. It would be beneficial if the poor rural people of the southern states would substitute other foods particularly animal protein and vitamin-containing foods for a large part of the corn meal.

H N H Green

WENRICH (D H), STABLER (R M) & ARNETT (John H) *Endamoeba histolytica and Other Intestinal Protozoa In 1,060 College Freshmen*. —Amer Jl Trop Med 1935 May Vol 15 No 3 pp 331-345 [19 refs.]

At a professional institution in Philadelphia a single stool specimen from each of 1 060 freshmen was subjected to examination for intestinal protozoa. Though the specimen had been obtained without the use of a laxative one or other of the usual intestinal protozoa were found in 34.5 per cent. 4.1 per cent. showing *Entamoeba histolytica*. The percentage of *E. histolytica* for Philadelphia and its suburbs was 5.2 a figure higher than that for other parts of that State. The cases of *E. histolytica* infection appeared to be as healthy as those giving a negative result, while no cases of amoebic dysentery were detected during the three years of this investigation. It is of interest that the supposedly rare *Dientamoeba fragilis* gave an incidence of 4.3 per cent.

C M W

PURCARO (Giuseppe) & ELISEI (Carlo) *Reperto parassitario nelle feci di individui provenienti dalla Sardegna e dalla Sicilia con speciale riguardo all'amebaesi.* [The Presence of Amoebae in Faeces of Sardinians and Sicilians in Modena.]—Arch Ital Sci Med Colon 1935 Aug 1 Vol 16 No 8. pp 574-581 English summary (3 lines.)

The numbers examined were small, 50 Sardinians and 50 Sicilians young persons who had never lived for any length of time in Modena.

40 were cyst passers and in 9 of 87 specimens from inmates of the Central Lunatic Asylum the cysts were found.

Disposal of night soil in Zomba is not satisfactory and flies are many. Rectification of the sewage disposal, cutting down banana groves where promiscuous defaecation occurs and of mango trees, a source of decaying pabulum for flies will do much to eliminate the fly nuisance.

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AUSTIN (T. A.) & MAYSE (L. C.). A Review of the Incidence of Amoebiasis in Zomba, with Special Reference to European Cases.—*East African Med J* 1935 June Vol. 12 No. 3 pp. 68-81

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H. H. S.

ALEXANDER (Frank D.) & MELEXEV (Henry E.). A Study of Diets in Two Rural Communities in Tennessee in which Amoebiasis was prevalent.—*Am J Hyg* 1935 Nov Vol. 22 No. 1 pp. 704-730. [22 refs.]

A survey of the diets in one community (Hatchie) where amoebic dysentery was common and in another (New Hope) where it

intestinalis 20 Some figures are given of the tolerance for heat and cold of a number of amoebae and flagellates while the relative values of direct examination and culture methods for the detection of each form are given. It has to be remembered that the *E. histolytica* of most authorities is divided by the author into *E. dysenteriae*, *E. dispar* and *E. hartmanni*. Presumably *E. dysenteriae* was not found in the school children because none of them showed any symptoms. It is difficult to suppose that all the tests which the advocates of *E. dispar* consider necessary to distinguish it from the pathogenic form were applied in all of the 44 cases of infection. In another paper the author states that *E. dispar* can only be differentiated with certainty from *E. dysenteriae* after passages in laboratory animals.

C M W

MORCOS (Z.) *Entamoeba histolytica* in Dogs—*Jl. Egyptian Med. Assoc.* 1938 Feb Vol. 19 No 2 pp 63-64

The author quotes from the literature records of natural and experimental infection of dogs with *E. histolytica* and goes on to state that at the Cairo Veterinary School all dogs suffering from diarrhoea or in a wasting condition are examined for helminthic or protozoal infection. Five cases have been reported in recent years 3 from Giza one each from Kobba and Heliopolis. All were passing watery blood-stained stools and vegetative forms of *E. histolytica* were seen in each. One of the first three was given emetine 0.03 gm. subcutaneously on 3 successive days [nothing is said of the other two from Giza] and the others had two Yatren pills daily for 10 days. The three whose treatment is mentioned recovered.

H H S

REICHENKOW (Eduardo) La cuestión de los portadores sanos de la amiba disenterica *Entamoeba histolytica* y el valor patogénico en general de los protozoos intestinales—*Medicina Paises Cérdidos* Madrid 1935 Sept. Vol 8 No 9 pp 409-420

DOPFER (Ch.) & DESCHIENS (R.) Action comparée du sérum humain et du sérum de cheval sur les cultures de l'amibe dysentérique. [Comparison of Human Serum with that of the Horse in the Cultural Growth of the Dysentery Amoeba.]—*C R Soc Biol.* 1935 Vol. 119 No 27 pp 1370-1373

In the investigation described in this paper it was found that two strains of dysentery amoeba gave 5 times more growth when human serum was used instead of horse serum in the medium employed.

C M W

YOSIZATO (Morio) Investigations on Amoebic Dysentery VIII. On a New Method for the Cultivation of *Entamoeba histolytica*—*Jl. Oriental Med.* 1935 Mar Vol. 22 No 3 [In Japanese pp 467-474 With 1 chart. English summary p 41]

The author maintains that the substitution of 3 per cent. sodium citrate solution for Ringer's or Locke's solutions in the composition of media intended for the cultivation of *E. histolytica* is an advantageous procedure.

C M W

DESCRIEUX (R.). Modification de la virulence pour le chat d'une souche d'amibes dysentériques conservée en culture. [Effect of Cultivation of *E. histolyticus* on its Virulence for Cats.]—Bull. Soc. Path. Exot. 1935 June 12. Vol. 28. No. 6. pp. 481-491. 12 refs.

The author discusses the experiments of various observers who have attempted to prove that the virulence of *Entamoeba histolyticus* does or does not diminish by culture in artificial media. He records observations which he has made with a strain of amoeba isolated from the stool of a case of dysentery, which at the time of isolation proved virulent for kittens; for two of three animals inoculated per rectum with the stool developed amoebic dysentery. The amoeba was maintained in culture by subculturing every 5 days and with cultures between the 80th and 220th day 10 kittens were inoculated per rectum and 13 into the liver, after laparotomy without one of the animals developing dysentery. It is concluded that a virulent strain of *Entamoeba histolyticus* may lose this virulence during prolonged cultivation. C. M. H.

GARDECHEAU (A.). À propos de la phagocytose amibeenne. [Phagocytosis by Amoeba.]—Bull. Soc. Path. Exot. 1935. June 12. Vol. 28. No. 6. pp. 420-422.

The paper refers to experiments carried out with an amoeba which the author has cultivated on agar from Saigon water. When amoebae come on to cultures of certain bacteria it destroys the bacteria very much as bacteriophage does. Certain bacteria are acted upon only if the amoeba is associated with *Hact. coli*. This amoeba, recently isolated, the author identifies with one he cultivated from human faeces in 1907 and which he named *Entamoeba phagocytoides*, believing it to be a form parasitic in the human intestine. He now refers to it as *Endolimax phagocytoides*, a name used by some observers for the parasitic *Endolimax nana* which certainly does not grow on ordinary agar media.

C. M. H.

GARCIA (Eusebio L.). Effects of Chlorinated Lime in Lethal Concentrations on *Entamoeba histolyticus* Cysts.—Philippines Jl. Sc. 1935. Mar. Vol. 58. No. 3. pp. 295-311. With 18 figs. on 1 plate. [13 refs.]

In estimating the length of survival of cysts of *Entamoeba histolyticus* in water or solutions of disinfectants, reliance has been placed on the assumption that dead cysts stain with eosin or that living cysts will give rise to cultures of amoebae when brought into suitable culture media. Both these tests of viability, the author regards as fallacious. He considers that direct observations on the cysts for evidence of internal degenerative changes in nuclei and cytoplasm, called by him necrobiosis, are more reliable. He finds that 3.5 parts per million chlorine (resulting from the addition of calcium hypochlorite) produces destructive changes in the cysts which are enhanced rather than diminished by the presence of nitrogenous organic matter. The strength of chlorine however renders water unsuitable for drinking.

C. M. H.

SUMI (I) & INOUE (K.) Investigations on Amoebic Dysentery VII. Simple Method for the Determination of Degenerated Trophozoite and Cysts of *E. histolytica* in the Feces.—*Jl Oriental Med.* 1935 June. Vol. 22 No 6 [In Japanese pp 1001-1009 [17 refs.] English summary pp 88-89]

The authors find that even after death *Entamoeba histolytica* can be distinguished from other cells by the character of the nucleus stained by mixing the material with 0.3-0.5 per cent aqueous solution of methyl green. The nuclei of the amoebae take much longer to stain than do those of cells. Cysts in faeces can be concentrated by emulsifying 1-2 gm. of the stool in 30 cc. of sugar solution having a specific gravity of 1.070. Some of the supernatant fluid (5 cc.) is filtered through gauze and centrifuged, after which 1 cc. of the supernatant fluid is diluted with water and centrifuged. The deposit will contain the cysts.

C M W

PENSO (Giuseppe) Sull' individualità morfologica dell'*Entamoeba dispar* (Brunpt) [Diagnosis of *E. dispar* on Morphological Grounds.]—*Arch Ital Sci Med Colon* 1935 Aug 1 Vol. 16 No 8. pp 563-573 With 5 figs. [12 refs.] English summary (2 lines)

The author has undertaken the difficult task of comparing morphologically the amoebae which occur in cultures obtained from a case of *Entamoeba dispar* (the human amoeba which though resembling *E. histolytica* morphologically is supposed to be never pathogenic to man and cats) infection and those in cultures of *E. histolytica*. He concludes that these can be distinguished for various reasons one of which is the eccentric position of the karyosome in a certain percentage of the amoebae in the *E. dispar* cultures. It seems that in the first place a diagnosis of *E. dispar* can only be made by attempting to infect cats and as these animals are not invariably susceptible to known *E. histolytica* the number of attempts is a matter of some importance. The author does not state how many attempts were made to infect cats with his strain. [Neither the originator of the idea that *E. dispar* was a species distinct from *E. histolytica* nor others who have adopted this view have made any claim that the two amoebae could be distinguished morphologically.]

C M W

SNAIC (Tsh.) Infection expérimentale du chat et du chien par *Entamoeba dispar* et *Entamoeba dysenteriae*. Réinfection et immunité croisée du chien. [Experimental Infection of Cats and Dogs by *E. dispar* and *E. histolytica*. Reinfection and Crossed Immunity in the Dog.]—*Ann Parasit Humaine et Comparée* 1935 July 1 Vol. 13 No 4 pp 345-350

The author points out that the separation of *Entamoeba dispar* from *Entamoeba minuta* of the cycle of *E. dysenteriae* can be effected with certainty only after their passage in laboratory animals. By this statement the author means that an infection with *E. dispar* which consists of small amoebae and 4-nuclear cysts morphologically similar to the carrier condition of *E. histolytica* infections where small amoebae and 4-nuclear cysts also occur can only be recognized by animal experiment in which the pathogenicity of the amoebae and cysts belonging to

E. histolytica contrasts with the relative lack of pathogenicity of those belonging to *E. dispar*. This view if correct, would of course make it quite impossible to distinguish the carrier condition of *E. histolytica* from *E. dispar* by direct microscopical examination. It is further pointed out by the author that the experiments he describes in this paper indicate that the dog always recovers from an experimental infection due to *E. dispar* but only occasionally from one due to *E. dysenteriae*. Furthermore the dog having recovered from an *E. dispar* infection cannot be reinfected with this amoeba though it can be infected with *E. dysenteriae*. Similarly one infection with *E. dysenteriae* usually but not always produces an immunity against this amoeba. When a dog is infected with *E. dispar* the infection lasts 6-8 days, whereas the infection with *E. dysenteriae* lasts 60-120 days. It has to be noted that only dogs under 6 months of age can be infected with *E. dispar*. The *E. dysenteriae* infection in dogs and cats is definitely pathogenic, producing ulcerations and amoebae with ingested red blood corpuscles. The *E. dispar* infection in these animals is quite benign. The author concludes that the dog is the most suitable animal in which to carry out experimental work with amoebiasis.

[To the reviewer it still seems futile to attempt to separate *E. dispar* from *E. histolytica* on the grounds of differences in pathogenicity. It seems to him that all the differences described can be more reasonably accounted for by the supposition that races of *E. histolytica* of varying virulence occur and that hosts vary in their susceptibility to the one species.]

C M W

HAKANSSON (E. G.). The Use of Aqueous Smears in the Study and Identification of the Amoebae of Man.—Acta JL. Trop. Vol. 1935. July Vol. 15 No. 4 pp. 439-453. With 29 figs. on 2 plates.

The author describes changes which occur in the intestinal amoebae of man when placed in water. The changes are not the same for each species so that they can be employed as an aid to diagnosis.

C M W

CHANG (Hsiao-ch sen) CHEN (Kuo-chen) & CHOU (Shou-kai). Further Observations on the Diagnosis of Amoebic Dysentery—Chinese Med. JL. 1936. Jan. Vol. 50 No. 1 pp. 17-28.

The authors' observations are based on a study of 50 cases of amoebic dysentery seen by them personally and on an analysis of 75 cases treated in the hospital wards. Among 45 cases of active amoebic colon only 51 per cent. were confirmed by faecal examination, 49 per cent. needed the sigmoidoscope. In many of those in whose stools amoebae were found repeated examinations were required before a positive result was obtained, in two of them as many as 15. At the Peking Union Medical College Hospital admissions for bacillary dysentery were ten times as numerous as those for the amoebic form. The latter was uncommon in children—none were below 9 years of age and only four below 15 years. Frank dysenteric symptoms—passage of blood and mucus with tenesmus and colic—were present in two-thirds only in about half, the characters of the stools differed essentially from those of the bacillary form but mixed infection with amoebic and bacillary

was present in about 7 per cent. The sigmoidoscope they maintain, is the best and quickest means for diagnosis it is simple harmless, and with care need not be unpleasant to the patient. H H S

FABIANI (G) & DENDALE (R.) Les réactions de gélification du sérum sanguin au cours de l'amibiase. [Gelification of Serum in Amoebic Infections.]—*Bull Soc Path Exot* 1935 July 10 Vol. 28. No 7 pp 556-557

The humoral changes which occur with regularity in many chronic diseases such as malaria leishmaniasis trypanosomiasis tuberculosis, syphilis leprosy are non-existent in amoebic infections as manifested by the failure of sera to give positive gelification reactions with formal or lactic acid. Furthermore the estimation in two cases of the total albumin of the blood and the albumin globulin ratio gave figures which were approximately normal. C M W

SPECTOR (Bertha Kaplan) The Pathological Changes produced in the Intestines of Kittens by *Endamoeba histolytica* with and without Certain Added Bacteria.—*Amer Jl Hyg* 1935 Sept. Vol. 22. No 2. pp 366-375 [20 refs.]

The incidence of amoebic infection and the severity of the lesions in kittens inoculated with *E. histolytica* are increased if the amoebae are inoculated along with certain freshly isolated bacteria such as haemolytic streptococci and pneumococci. These bacteria cease to have this effect after prolonged culture. C M W

WILLIAMS (Pauline) Amebic Abscess of the Liver Report of Fatal Case in which Etiology was First Demonstrated in Tissue Sections of Diaphragm, following Autopsy No Previous Manifestations of Amoebiasis.—*Southern Med Jl* 1935 Oct Vol. 28 No 10 pp 902-905 With 2 figs.

The interest of this case lies in the fact that none of the usual methods of diagnosing amoebic abscess was successful. There was known to be a large liver abscess present and this had extended through the diaphragm to the right lung. Examination of the liver pus of the expectorated matter of scrapings from the wall of the abscess cavity and of the stools failed to reveal the entamoeba. The patient died and again examination of the lung the liver and the intestine was negative for the protozoon. The diaphragm was thickened and oedematous with an area of necrosis and ulceration and in sections of this the entamoebae were numerous. No history of exposure to infection nor of any previous dysenteric symptoms was obtainable. H H S

BERETRVIDE (Juan José) & MASOCH (Tomas J.) Hepatitis amebiana congestiva a forma tumoral. [Localized Congestive Amoebic Hepatitis.]—*Arch Argentinos Enferm Aparato Digest y Nutric* Buenos Aires. 1935 Aug-Sept. Vol. 10 No 6 pp 589-596

The case is reported of a man of 32 years with signs of a swelling of the upper part of the left lobe of the liver and localized pain. The leucocytes in his blood were 14 000 per cmm. with 57 per cent. polymorphonuclear. The faeces showed *E. histolytica* in large numbers although no history of dysentery was obtained. The condition improved with

rest but, after he had been 24 days in hospital, emetine was given and the swelling stated to be as large as an orange disappeared, together with the pain. H H S.

EXTRAMONILAY (H. A.) Amoebic Hepatitis.—*Jl. Egyptien Med. Assoc.* 1935 Dec. Vol. 18 No. 12 pp. 783-791

MARINO (S.) Ascenso amebico del fegato. Contributo clinico.—*Pediatria Soc. Prat.* 1936 Mar 9 Vol. 43. No. 10. pp. 434, 435-441-4 447-8. [18 refs.]

HUARD (P.) REXCOFF (A.) & HUYNH VAN DON Les abcès du foie amibien. [Liver Abscesses other than Amoebic.]—*Bull. Soc. Méd.-Chirurg. Indochine* 1935 Sept. Vol. 13. No. 7 pp. 68-873

There is undoubtedly a tendency for medical men practising in the tropics and subtropics to regard hepatic abscess as a sequel of amoebic dysentery or as a form of amoebiasis to the exclusion of other causes and to try the effects of emetine or some drug treatment before resorting to operative measures—a procedure justified in the first case but disastrous in the second. Hence this article, though breaking no new ground, is worth noting because cases are detailed in which mistake might easily be made and valuable time lost. Among these mention may be made of streptococcal abscess arising from infection of an old amoebic lesion, liver abscess as one of several occurring in a staphylococcal septicaemia, another due to ascariasis, one to *Pf. vivax* as a complication of melioidosis, etc. The moral is, of course, that careful examination should be undertaken to determine the amoebic source of the abscess before deciding to postpone operation. H H S

MEYER-MAY (J.) & HUARD (P.) Note sur l'étiologie des abcès du foie. [On the Causation of Liver Abscess.]—*Bull. Soc. Path. Exot.* 1931 Jan. 8. Vol. 29 No. 1 pp. 61-72.

This article has been written on an analysis of 150 cases of hepatic abscess seen at the surgical clinic of the Hanoi School of Medicine. Of the total 138 were males, 12 females. 68 were in whites, 84 in natives, the latter including Tonkingese, Hindus and Koreans. Forty-five (28.6 per cent) were definitely known to have had dysentery, 66 had not and 41 were doubtful. The pus was examined for organisms and amoebae were found in 7 only among 70 faecal examinations amoebae were seen in five. Amoebic origin seemed to be more frequent in those from certain districts, rarer in others, e.g. Tonking. [This statement is based on previous statistics when the diagnosis was made on purely clinical grounds.] Causes other than amoebic are reported in 27 cases [but "causes" is hardly justified, as from the text it appears that all that is meant is "organisms isolated, their aetiological role is not proved and in some at least is highly problematical"] Staphylococci were found in 5 streptococci in 4 "various cocci" in 5 *Bac. coli* in 4 *enterococcus* and *pneumococcus* each 3 *Pf. vivax* *Bac. dysenteriae* His, and fusiform bacilli each once.

The staphylococcal origin was certain in one case as the liver abscess occurred as a complication of a severe furunculosis with septicaemia. [While the presence of cocci and intestinal organisms does not

prove these to be the cause of the abscess neither does the failure to find entamoeba disprove the aetiological rôle of the latter] H H S

PANAYOTATOU (Angélique) Sur un cas d' amibiase intestinale et bronchique [Intestinal and Bronchial Amoebiasis.]—*Rev Méd & Hyg Trop* 1935 Sept-Oct. Vol. 27 No 5 pp 231-232.

A child of 2 years was seriously ill with amoebic dysentery and a persistent cough which prevented any rest at night. The stools numbered 30-35 in the 24 hours contained blood and entamoebae and were accompanied with tenesmus. Emetine hydrochloride 0.03 gm was given together with 0.1 gm. camphostyle solution. Amelioration was rapid the stools were only half as frequent next day and in a few days were reduced to 3 or 4 in the day and free from blood. The cough also cleared up after the third day. [There is no direct evidence that the cough was due to bronchial amoebae the reason for so regarding it is that it disappeared rapidly after injections of emetine and that other cases of bronchitis without any intestinal amoebiasis when treated in the same way did not thus respond.] H H S

CHAUVIN (Louis) Sequelles d'amibiase avec poussées congestives hépatiques syndrome de colite spasmotique pneumopathie seconde. [A Case of Amoebiasis with Sequelæ]—*Tunisie Méd* 1936 Jan. Vol. 30 No 1 pp 1-8

The chief point worthy of note in this case is the scarcity of objective signs to account for persistent subjective symptoms and complaints. The patient was a Sergeant a male army sick attendant a Tunisian who was admitted to hospital in Fez in 1928 suffering from amoebic dysentery. This was followed later in the year by symptoms of appendicitis and appendicectomy was performed. In the summer of 1929 he had a relapse of his dysentery with much pain in the right iliac fossa a second laparotomy was performed but nothing discovered to account for the symptoms. In the spring of 1930 he again relapsed with dysentery and had pain in the hepatic area and in the right shoulder. The blood showed a little anaemia red cells 3,990,000 white 9,300 per cmm. Improvement of symptoms followed administration of emetine for 5 days then stovarsol and [for some reason not mentioned as the infection was amoebic] dysentery bacteriophage. Soon after shoulder pain and pain on breathing were marked, and there was a subicteric tint of the conjunctivæ he expectorated chocolate-coloured sputum. Physical signs in the thorax were a few fine crepitations beneath the right clavicle on the left side in front harsh inspiration and behind slight VF+ and fine subscapular crepitations. Emetine was again given this time intravenously 4.6 and 8 cgm. and stovarsol. Convalescence was thereafter rapid.

H H S

OGURO (T.) Ueber einen Fall von im Verlauf der Amöbendysenterie beobachteter Tetanie. [Tetany in Amoebic Dysentery]—*Taiwan Igakka Zasshi (Jl Med Assoc Formosa)* 1935 Nov Vol. 34 No 11 (368) [In Japanese pp 1844-1849 German summary p 1850]

A woman of 36 years suffering from dysentery and whose condition was improving after administration of emetine and yatren developed

signs of tetany—Trousseau's, Chvostek's, Erb's (increased electric irritability of motor nerves) signs, and Schlesinger's leg phenomenon were all present. The calcium content of the serum was 8.6 mgm. per cent. later increased to 10.9. In spite of all treatment the patient became weaker and died two weeks after the onset of the tetany [This is of interest as possibly being an example of dysentery which might be followed by spiroe had the patient lived, since the serum calcium was so reduced. Schlesinger's phenomenon is elicited by holding the patient's leg at the knee and flexing strongly at the hip. In a short time an extensor spasm occurs at the knee with marked separation of the foot.]

H. H. S.

WILKINSON (W.) Chronic Amoebiasis and Chronic Appendicitis.—*Brit Med J* 1935 Sept. 7 pp 452-453.

It is not an uncommon experience to meet with patients who complain after sometimes a long time after an appendicectomy that they suffer from abdominal discomfort, flatulence, biliaryness, general malaise and pain more or less localized to the right iliac fossa, and who present a certain degree of pallor, a furred tongue, a thickened and tender colon and an enlarged liver. Examination of fresh stools from these patients in the tropics reveals in a considerable number *E. histolytica*. The importance of the freshness of the stools is well known to all workers in the tropics and is well exemplified in Kenya where 368 cases only had been recorded during ten years among Europeans and natives examined at the laboratory some distance away but in 5 months at the European hospital alone 123 positive findings were recorded when stools were examined on the spot. Treatment on the usual lines for amoebiasis proved efficacious among those with amoebas in the stools and the same treatment was adopted for negative cases presenting similar symptoms and these also benefited. Two typical cases are reported in detail.

Treatment of chronic amoebiasis is disappointing because the amount of the drug needed to act on the parasite which may be deep in the tissues is usually more than the patient can tolerate with safety. Carbarsone is probably the best of its congener ambarone. Again, in the tropics there is often a liability to re-infection, since in East Africa [and elsewhere] amoebiasis is far from uncommon among Africans, and cooks and houseboys may be excret passers.

H. H. S.

LORENARDO (Vito) L'appendicitis in portatori di ameba. [Appenditis in Amoeba Passeri].—Riv Sanitaria Siciliana. 1935 Sept. 15 Vol. 23 No. 18 pp 1383-4, 1387-8, 1391-2, 1395. French summary (6 lines).

The author has examined the appendices removed from 15 persons who were found at the time (i.e., just before operation) to be passing *E. histolytica* in their stools. He took the appendix in each case immediately after the removal and examined the contents fresh and stained and also sections of the walls. Fourteen were completely negative in one preparation only of one of the patients he found motile forms of the Entamoeba. In another patient who was passing large numbers of them and whose appendix showed points of ulceration, he had great hopes of finding them, but found none. In no instance

was there any histological lesion attributable to the amoeba. He concludes that in Catania at all events appendicitis due to Entamoeba must be very rare.

H H S

BONNIN (H.) La colite amibienne [Amoebic Colitis.]—*Ge. hebdomadaire des Sciences Médicales de Bordeaux* 1935 Sept 1 Vol 56 No 35 pp 546-553 [56 refs.]

A general review of the subject. The author divides the complications which are met with in intestinal amoebiasis into five groups infective toxic, parasitic (i.e. concomitant presence of other protozoa such as *E. coli* and *Giardia lamblia* and also *Blastocystis hominis*) dystrophic (ulceration cicatrization) and nervous and functional (dyspepsia meteorism abdominal pain irregularity of bowel action etc.). His clinical subdivision into latent amoebiasis (without symptoms) cases with constipation with diarrhoea intermittent at intervals short or long or almost constant or less severe but chronic is not very satisfying.

H H S

CARLES (Jacques) & BONNIN (H.) Les colites amibiennes et post-dysentériques [Colitis Amoebic and Post-dysenteric.]—*J. M. de Bordeaux* 1935 Nov 20 Vol 112 No 30 pp 831-834

A congress paper on general lines chiefly from the clinical aspect. The authors divide the symptoms into four main groups infective often due to growth of secondary bacteria toxic from digestive disturbances and bacterial development dystrophic and nervous entero-neuroses and functional. The condition may be latent producing practically no symptoms or associated with constipation or diarrhoea or these alternating and the diarrhoea may be intermittent or chronic with abdominal pain situated anywhere along the colon or caecal region. The article is a fair summary of knowledge but introduces no new facts.

H H S

TROWELL (H. C.) Loose Stools with Particular Reference to Amoebiasis—*East African Med J* 1935 Nov & Dec Vol 12 Nos 8 & 9 pp 229-234 282-291 & 1936 Jan No 10 pp 299-310 [25 refs.]

MOSTO (Domingo) Tres casos de perforación intestinal por amebiasis. [Amoebiasis with Perforation of the Intestine.]—*Arch Argentinos de Enfermedades del Aparato Digestivo y Nutrición* Buenos Aires. 1935 Aug - Sept. Vol. 10 No 6 pp 541-562. With 16 figs.

Three cases are described as regards history and post-mortem findings. The first was a man of 40 years who died at the time of admission while he was being examined. There is no statement as to the length of illness. Perforation was situated in the transverse colon there was also an abscess in the right lobe of the liver. The second patient was a girl of 17 years who had been ill with vague symptoms—praeccordial pain palpitation later oedema of legs troublesome cough and loss of weight—for some 6-7 months but a fortnight before admission suffered with intense pain in the left hypochondrium. Post-mortem revealed perforation at the base of the appendix and an ulcerative endocarditis. The third was a man of 40 who had suffered with dysenteric symptoms for some 15 years more severely during the last

3 years. At autopsy he showed dysenteric ulceration of the cecum and colon, perforation in the descending colon and an amoebic abscess of the spleen. The article contains good photomicrographs.

H H S.

MAJUMDER (A. R.) Atypical Manifestation of Amoebiasis—Reprinted from Med College Magazine 1935 Dec. Vol. 8. No. 2 6 pp

This article though the fact is not stated would appear to partake of the characters of a clinical lecture. A better title in the opinion of the reviewer would be non-dysenteric manifestations and sequelae of amoebiasis. Attacks of dyspepsia, of sudden haemorrhage by the bowel, symptoms of appendicitis even perforation may occur in patients in whom the amoebic infection was not suspected or had been forgotten. Hepatitis and pulmonary abscesses are so well recognized complications or sequelae that they are hardly to be classed now as atypical manifestations. The author writes cerebral and spinal abscesses and also pyelitis, cystitis and epididymitis are caused by amoebic embolism but no references are given in support of this. Again is it quite correct to class bacterial leak sometimes responsible for subacute arthritis, synovitis myositis and neuritis and cases of epidemic dropsey whose stools show amoebic cysts or leucoderma associated with chronic amoebiasis as constitutional effects of chronic amoebiasis or as atypical manifestations of amoebiasis? Arthritis neuritis and some other complications mentioned are more common in bacillary than amoebic dysentery and may be due to the double infection as well as to a leak of *Streptococcus viridans* via intestinal lesions caused by *E. histolytica*. The author regards the anaemia of pregnancy as due to deficiency of the red cell maturing anti-anæmic principle and one factor at least is chronic amoebiasis."

H H S.

RICO (Alfred C.) & ANDERSON (Hamilton H.) Amoebiasis and Cancer of Colon.—Am J Med Sci 1936, Feb. Vol. 191, No. 2 pp 237-250 With 8 figs (4 on 2 plates) [10 refs.]

An interesting account of four patients, one man and three women, of ages ranging between 40 and 49 years, in whom carcinoma developed upon amoebic infection of the colon. The duration of the amoebiasis was from 3 to 10 years, two had had no previous treatment for the amoebiasis, the condition having been undiagnosed, one had had intensive early treatment, the other late, with emetine. The author urge that in view of this possible malignant development x-ray confirmation and barium enema should be carried out in all cases of recurrent amoebic dysentery. There are two ways possibly more, in which amoebiasis may be succeeded by carcinoma, irritation and reaction (not that there is not some subsidiary factor see below), growth, polypoid and adenomatous, being set up these being tumours which readily become malignant.

They postulate several possibilities as regards these predisposing, concomitant or subsidiary factors, which call for further study.

"Is there some predisposing factor which facilitates the development of chronic ulcerative colitis and cancer as a sequel and complication of amoebiasis? Do vitamin G and the intrinsic gastric hormone play a part

in this predisposition? Is there a relationship here to the frequently noted importance of high vitamin diet in the treatment of amoebiasis? Does the course of the disease and the eventual occurrence of malignancy or the obscure chronic increasing lesions of amoebiasis depend on or have relation to deficiency of vitamin G or vitamin B? Do these same factors have any bearing on the sequential relation of cancer to amoebiasis?

H H S

McMULLIN (J. J. A.) *Amoebiasis and its Surgical Complications—U.S. Nav Med Bull* 1935 July Vol. 33 No 3 pp 313-324

CASTELLANI (Aldo) *Three Clinical Signs useful in the Diagnosis of Chronic Amoebic Colitis.—Jl Trop Med & Hyg* 1935 Nov 1 Vol. 38. No 21 pp 267-268.

The classical symptoms of chronic amoebic colitis—diarrhoea with blood and mucus—are often absent and the entamoeba may be looked for day after day in vain. The author mentions a case where no amoebae or cysts or Charcot Leyden crystals were seen in 89 consecutive daily examinations but positive results were obtained on the 90th day. He mentions three clinical physical signs due to affection of the liver in latent or very mild amoebic colitis though hepatitis fever and leucocytosis are absent. The first two signs are elicited with the patient recumbent. (1) Percussion from the umbilicus to the ensiform cartilage results in production of pain when the percussion reaches immediately below the ensiform cartilage. Pressure will elicit the same sign. The pain of duodenal ulcer or hyperchlorhydria is usually lower along this line while that due to cholecystitis is to the right of it. (2) The midaxillary line is marked with a pencil from a point 4 cm. below the nipple a line is drawn horizontally to meet the former line at a right angle. The sign is dulness to firm percussion at the spot where these two lines meet and for a short distance outside it. (3) With the patient sitting up in bed a band of dulness is present at the right base and tactile fremitus there may be increased. This is ascribed to an enlarged liver thrusting up the diaphragm and giving the signs of partial consolidation of the lung adjacent.

The author states that in his experience the first sign is present in some 15 per cent. of such cases of amoebic colitis with little or no other indication the second in 20 per cent. and the third in 10 per cent. The combination of two is very suggestive and three almost diagnostic.

H H S

TRABAUD (J.) *Les aspects médicaux de l'amibiase en Syrie. [Amoebiasis in Syria Its Medical Aspects.]—Jl Egyptian Med Assoc* 1935 Sept. Vol. 18. No 9 pp 579-589 [28 refs]

Malaria trachoma, Aleppo boil three-day fever and amoebiasis are the chief diseases of Syria, says Professor Trabaud but if we take into account latent manifestations the greatest of these is amoebiasis. Few escape infection whether Europeans or natives because vegetables are contaminated and the dust of the road contains the cysts in dried faecal deposits. The baby at the breast is infected from the soiled hands of the mother. The author then relates anomalous symptoms associated with the presence of amoebae or cysts in the stools clearing up on treatment with emetine stovarsol, etc. Apart

from clinical dysentery and liver pain due perhaps to amoebic cholecystitis be mentions pulmonary or liver abscess, cystitis, pyodermatitis meningitis mental disturbance, anxieties phobias and so forth. [It seems a slight misuse of terms to classify these as latent forms of amoebiasis.]

H. H. S.

WALDORF (Carlos P.) Amebiasis y anemias graves. Consideraciones sobre la anemia perniciose en la amebiasis.—Prensas M&M Argentina. 1935 Nov 13 Vol. 22 No. 48 pp. 215-222
With 2 figs [18 refs.]

BROWN (Philip W.) Results and Dangers in the Treatment of Amoebiasis. A Summary of Fifteen Years Clinical Experience at the Mayo Clinic.—*J. Amer. Med. Assoc.* 1935 Oct. 28 Vol. 105 No. 17 pp. 1319-1325. [18 refs.]

This is an instructive summary of a fairly wide experience in the treatment of amoebiasis. The article is divided into three sections, apart from some introductory remarks. The first considers the drugs commonly used in this condition viz., emetine hydrochloride tropon, acetarsone, arsphenamine, chiniofon (yatren) ipecacuanha, bismuth emetic iodide, vioform, and carbarsone but except with the first the number of patients treated was too small for valid inference. Emetine hydrochloride was given to 554 patients, and ill effects shown in some were peripheral neuritis, palsy and cardiovascular disturbances, rapid pulse, asthma, vomiting and diarrhoea. Eight presented those symptoms in a fairly marked degree and another eight in mild form. Acetarsone (stovarsol) was used in 232 cases without a death (though others have recorded fatalities from its use). 13 suffered from severe toxic erythema, some so severe as to amount to dermatitis exfoliativa, one patient had serious peripheral neuritis which did not clear for nearly a year. Three hundred and one were given trepanol & showed a toxic erythema, four at the end of the first course of 3-3.75 gm., four during or at the end of the second course of 3 gm. the symptoms subsided in 3-5 days. Yatren was used in 37 cases only and vioform in 18.

The second section deals with the results of treatment. On this there is not much to say here for "cure" is used to imply that not less than two examinations of stools were made on successive days following completion of treatment though it is stated that in most cases repeated examinations were made over a period of months to several years. [The results would have been more informative if only those were regarded as cured in whose faeces the amoeba could no be found in repeated examinations after a purge, during a period of six months or so.] Better results were obtained with arsenicals and the combined treatment of emetine and arsenical was found to succeed in patients who had resisted either singly. In fact, emetine has come to be regarded as suited to control the acute symptoms only "Very often the ammonium immunizes reactions to the drugs," states the author "and seems more effective in finally obtaining a cure." The barrage of arsphenamine, emetine, bismuth emetic iodide, chiniofon, carbamoyl acetarsone, trepanol, vioform and ipecac. is indeed startling, and one asks what good any one drug is when such a variety is used. It may however a cure was finally obtained even to very resistant infections.

Finally the author briefly states the present methods of treatment which he employs.

If the patient has not received antiamoebic treatment recently he is given 0.065 gm. (1 grain) of Burroughs Wellcome & Co emetine hydrochloride subcutaneously twice daily for three days. After an interval of a week, 0.043 gm. (two-thirds grain) of emetine is given twice daily for three more days. With the institution of the emetine treparsol 0.25 gm. (4 grains) is administered orally with each meal for four days. If there is no intolerance to arsenic, two more such courses are prescribed with intervals of ten days between the courses.

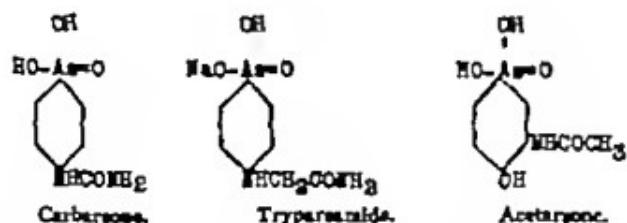
If stool tests are positive following this regimen three courses of chunlofon are prescribed 3 gm. orally per day for a week and repeated for two more such courses with a week's interval between courses. If diarrhoea is increased the daily dose is decreased thereby prolonging each course. Failure after this would indicate a course of one injection of arsphenamine weekly for six weeks and 1 drachm (3.88 gm.) of bismuth subnitrate from three to six times daily during the period.

H H S

EPSTEIN (Ervin) Toxicity of Carbarson. Acute Fatty Degeneration of the Liver, Exfoliative Dermatitis and Death following its Administration.—*Jl Amer Med Assoc* 1936 Mar 7 Vol 106 No 10 pp 769-772

In view of the fact that carbarson is used in the treatment of amoebiasis and is generally thought to be comparatively innocuous at all events in the doses usually employed, this record is of considerable importance.

Carbarson or P carbaminophenylarsionic acid ($H_3O_3AsC_6H_4NHCONH_2$) contains 28.8 per cent. arsenic acid and is supplied in capsules containing 0.25 gm. Seeing that it is closely allied to tryparasamide and acetarsone (stovarsol) (see formulae) it is surprisingly non-toxic.



The case recorded is the first fatal case which the author has been able to find recorded. A woman of 55 years suffered from anorexia and diarrhoea (8-10 motions daily) for several months and in spite of varied treatments obtained no relief. The stools revealed Giardia in large numbers but no other abnormality. Her last treatment before coming to hospital was carbarson of which she took 5 gm. in 10 days 2.5 gm. was given in enemas but these were not retained. She received altogether 83.3 mgm. per kilogram body weight. On admission the mucosae were pale the skin dry erythematous and covered, especially the legs, with a scaly eruption the hair was dry, grey and lustreless. There was considerable anaemia r.b.c. 2,640,000 Hb 46 per cent. (Sahli) leucocytes 5,650 per cmm. She progressed to a certain degree

acid) and is administered in the same way 0.25 gram in gelatin capsules twice a day *per os* for 10-15 consecutive days. The patients are on ordinary diet, and a saline purgative is taken with the amoebiasis. Cure is recorded when six or more consecutive stools have been examined on different days and found negative as regards presence of *E. histolytica*.

Of 40 patients who received this treatment 25 or 62.5 per cent. were cured in 10 (25 per cent.) the result was indeterminate and in 5 (12.5 per cent.) it failed. The "indeterminates" showed much general improvement but left hospital before the usual six examinations had been completed. The ratio of probable cures to failures was, therefore, 5 : 1 with carbarasone it was 5.7 : 1

H H S

To (Sömer) & Kyr (Kerten) Sechs weitere Fälle von Amoeben-Dysenterie mit Carpaine behandelt. [Six More Cases of Amoebic Dysentery treated with Carpaine.]—*Tszenen Igekton Zsch. (J. Med. Assoc. Formosa)* 1935 Dec. Vol. 34 No. 1 pp. 1-2
[In Japanese pp. 2063-2068. German summary p. 2069.]

In 1934 the authors treated a case of amoebic dysentery with carpaine by way of experiment and obtained complete cure. They now record six more cases. Four were in the acute stages with fever stools containing blood and mucus and showing amoebae. After 5-7 injections of carpaine [the dose is not mentioned] the blood, mucus and amoebae disappeared and subjective symptoms cleared up. The other two had received treatment with emetine, but without success and the condition had become chronic. In these the carpaine injections were followed by amelioration of symptoms and the amoebae in the stools were fewer but cysts still were visible. The administration of salvarsan *per os* in addition to the carpaine by injection brought about a cure with disappearance of the cysts.

Except for a local inflammatory reaction at the site of injection which disappeared by the following day no ill effects were observed in any of these six patients. The first patient treated with carpaine had reacted strongly with inflammation and oedema of the limb, this, in the authors' opinion, was due to the fact that the patient was a worker in metal and they think his occupation was in some way responsible.

H H S

CASTELLANI (Aldo) The Treatment of Amoebic Colitis with Iodoform.—*J. Trop. Med. & Hyg.* 1935 Nov. 1 Vol. 38 No. 2 pp. 288-289

The author speaks highly of the results following the use of iodoform in subacute and chronic cases of amoebic colitis. The patient stays in bed and is given a very light or fluid diet, and after a purge of magnesium sulphate iodoform is given in keratinized capsules each containing 0.05 gm. ($\frac{1}{2}$ grain) one or two 3-4 times daily for 12-15 days. After an interval of a week the course may be repeated. The drug may also be given by enema 0.2-0.3 gm. in 300 cc. water. Nine cases are referred to and two are detailed. In one the amoebae disappeared on the 4th day and in the other on the 8th day after the treatment was started. Only one patient showed any toxic symptoms, and he complained merely of slight vertigo on the twelfth day.

H H S

DYCKERHOFF (Hedwig) Ueber Leberschädigung durch Yatren
 [Damage to the Liver after Yatren.]—*Muench Med Woch* 1935
 Nov 8. Vol. 82. No 45 pp 1802-1803 With 1 fig

Cases of injury to the liver have been reported as following intra venous administration of yatren. The lesions found bear a strong resemblance to those of subacute yellow atrophy as seen in arsenic and chloroform poisoning. The author carried out experiments with rabbits using a 5 per cent solution of yatren. In normal animals very little change was set up in spite of the doses being higher correspondingly than is used in man. If however by dietetic means the glycogen content of the liver is reduced, then doses previously innocuous set up the condition described. Under certain circumstances therefore intravenous injection of yatren can lead to serious disturbance of the liver and it is incumbent upon us to forestall this by careful preliminary examination and determination of the bilirubin content of the blood.

H H S

FAUST (Ernest Carroll) & SWARTZWELDER (John Clyde) Use of Liver Extract Intramuscularly in the Course of Acute Amebiasis in Dogs—*Proc Soc Experim Biol & Med* 1936 Jan. Vol 33 No 4 pp 514-518

The authors have previously recorded the effects of raw liver and powdered liver extract on *Entamoeba histolytica* in dogs experimentally infected when the liver is administered *per os*. In the present article they give an account of the use of the extract when injected intramuscularly in dogs similarly infected. In 6 animals a commercial Parke, Davis & Co's product was used in another 8 a fresh liver extract prepared by themselves. One cc. was equivalent to 5 gm. of fresh pig's liver. It was administered alternately into right and left gluteal regions in doses of 2 cc. The infecting protozoa were a human strain after passage through several dogs. In all of the experimentals (with one exception a dog which had probably received an inadequate amount of the extract) the erythrocyte count was high and the Hb percentage fair usually over 50 and in some 80 in spite of the loss of blood by the bowel. Other dogs not receiving liver showed decrease in rbc's so the increase was not due merely to loss of fluid. In spite however of the blood changes the effect on the entamoeba was slight or nil when thus administered intramuscularly—markedly contrasting with the results of oral administration. It is concluded that the fraction of raw liver which is efficacious as an amoebostatic agent is either different from that which prevents erythropoiesis or that its amoebostatic action is inhibited when it is introduced intramuscularly [See also this *Bulletin* 1931 Vol. 28 p 783 1932 Vol. 29 p 586 1935 Vol. 32 pp 191 777]

H H S

MASSIAS (Charles) Hépatite amibienne suppurée à propos de dix-neuf cas personnels traitement émétinen la question des abcès du foie non amibiens—*Bull Soc Méd Chirurg Indochine* 1935 Dec Vol 13 No 10 pp 1625-1636 [35 refs.]

HUARD (P) & MAY (Meyer) Traitement des abcès du foie—*Bull Soc Méd Chirurg Indochine* 1936 Jan. Vol. 14 No 1 pp 76-149

MILLISCHER. Considérations sur la thérapeutique médicale actuelle de l'amibiase.—*Jl Egyptian Med Assoc* 1935 Aug Vol. 18 No 8 pp 553-563

funnel into a small 15 cc. glass receptacle [in the illustration this resembles a medicine glass in shape] fill to the top with the sugar-formic-acetic solution and leave for 30-40 minutes. Then place a coverlip in contact with the surface and transfer to a slide for examination. By this method Ankylostome Trichuris and fecundated Ascans are concentrated unfertilized Ascans eggs rarely. Taenia and Hymenoleps are fairly well concentrated and also coccidia, but not *Faecula latissima*, nor protozoa.

H H S.

TAKASAKI (J) Prevalence of Intestinal Parasites, particularly of Hookworms in Saitama Prefecture and its Prevention Work.—*Jl Public Health Assoc Japan* 1935 Oct. Vol. 11 No. 10 pp 1-12.

The survey covers 874 680 persons examined during 13 years by Iaonta's antiformin ether method by the same staff. The percentages of infection were totals 75.6 hookworm 34.7 roundworms 34. whipworms 23.1 trichostrongylus 1.4 threadworms 0.5 liver flukes 0.8 *H. nana* 0.02, *H. dentatus* 0.01 and a few had metagonia. Cure rates after treatment are put as 46.6 after thymol [mention of essential participation being omitted] 50 after "nematol" and 64 after parantol. Repeated treatments at intervals of 1 to 3 yrs were followed by progressive lessening of infection, there being no mention at all of any accompanying sanitation. Infection did not produce any recognized loss of physique.

C L

CALVO FOXSECA (Rafael) KOTRI (Pedro) & BASQUERO (Jose G.) Porcentaje y distribución geográfica del parasitismo intestinal en Cuba. [Intestinal Parasitism in Havana.]—*Iids* 1935 Dec 15 Vol. 38 No. 6 pp 629-635.

The authors examined the faeces of 1,797 individuals in the town of Havana with a view to determining the prevalence of parasites, helminthic and protozoal. Of the total 630 or 36.4 per cent. were positive 12.8 per cent. had protozoa only 6.4 had helminth infestations also and 17.3 worms only. There were 1,267 children and of these 43 or 37.8 per cent harboured parasites among the 630 adults 17.4 or 33.2 per cent. Of the helminthic infestations the commonest was Trichuris (18.2 per cent.) next Ascans (6.9) Enterobius (1.4) and *Vermicularis* (0.8 per cent. only). Of protozoa *E. coli* was seen in 12.4 per cent. *G. intestinalis* in 7.6 and *E. histolytica* in 1 per cent. There was practically no difference as regards sex among the females 37.4 and among the males 36.6 per cent. were infected. The authors state "The examination for protozoa was not thorough, the chief object being determination of helminths. We have not recorded *Giardia lamblia*, *E. nana*, *Trichomonas hominis* which are fairly common in Cuba. The authors also omit to give their method of examination either for protozoa or helminths."

H H S.

KOTRI (Pedro) CALVO FOXSECA (Rafael) & BASQUERO (Jose G.) Porcentaje y distribución geográfica del parasitismo intestinal de Cuba. Provincia de la Habana. [Intestinal Parasites in the Province of Havana, Cuba.]—*Medicina de Hoy* Habana 1935 Mar Vol. 1 No. 2 pp 32-38.

The authors examined altogether 3,446 faecal specimens [method not stated], of which 1,797 were inhabitants of the town of Havana and the

remainder in 26 adjoining districts. They found 1,637 or 47·5 per cent. positive [the total is at variance with details given later]. Protozoa were not specially looked for but recorded when seen. *E. coli* was found in 508 or 14·7 per cent. *Giardia lamblia* in 208 or 6·0 per cent. and *E. histolytica* in 38 or 1·1 per cent.

Recording the findings by prevalence in sexes it is stated that of 1,524 females 741 or 48·6 per cent. were passing ova or parasites and 596 or 45·2 per cent. of 1,318 males [this would give a total of 1,337 positive among 2,842 examined]. In their summary the authors state that protozoa alone were found in 303 protozoa and helminths in 204 worms only in 826. *Trichuris* was the most frequent being present in nearly one third of the total, *Ascaris* next 11·6 per cent. *Necator* 2·5 *Enterobius* 1·8.

H H S

FAUST (Ernest Carroll) & HEADLEY (William Hugh) Intestinal Parasite Infections of the Ambulatory White Clinic Population of New Orleans.—*Amer Jl Trop Med* 1936 Jan. Vol. 16 No 1 pp 25-38 With 2 figs

RAMSEY (G. W. St C.) A Study on Schistosomiasis and Certain Other Helminthic Infections in Northern Nigeria.—*West African Med Jl* 1934 Oct. Vol 8 No 2 pp 2-10 and 1935 Jan. No 3 pp 2-7 With 4 graphs. [31 refs.]

The author's summary adequately states the results of his investigations—

1. The advantages and limitations of the cutaneous test for bilharzial infection have been discussed. It has been concluded that the test cannot replace diligent examination of the excreta, but rather that both methods of diagnosis should be employed where possible.

2. The results obtained with the cutaneous test at different ages show that there is a rapid rise in the proportion of positive reactions until the age of about eleven years and that thereafter there is a slight but progressive fall.

3. It has been shown that vesical schistosomiasis has been diagnosed in nearly thirty two per cent. of all cases and that among children it was found in proportions varying from sixteen to eighty four per cent. Intestinal schistosomiasis was proved in fifteen per cent. of all cases the incidence among children ranging from nine to thirty nine per cent. It has also been shown that the cutaneous test for bilharzial infection was positive in sixty-seven per cent. of all cases with extremes ranging from thirty five to eighty per cent. in different localities. Finally it has been recorded that in certain places the mallams state that every boy at some time in early life suffers from gross haematuria. Together these observations form a chain of evidence which inevitably implies the conclusion that schistosomiasis is rampant in Northern Nigeria and in some places well nigh universal. Vesical schistosomiasis is apparently the more prevalent form of the disease but the intestinal form is also common—probably more common than our results have indicated.

4. Hookworm and tapeworm infestations are common. In a total of 550 cases examined by the D C F technique eighty nine per cent. were found to be excreting hookworm eggs. *Necator americanus* and *Taenia saginata* are the prevailing species of these parasites.

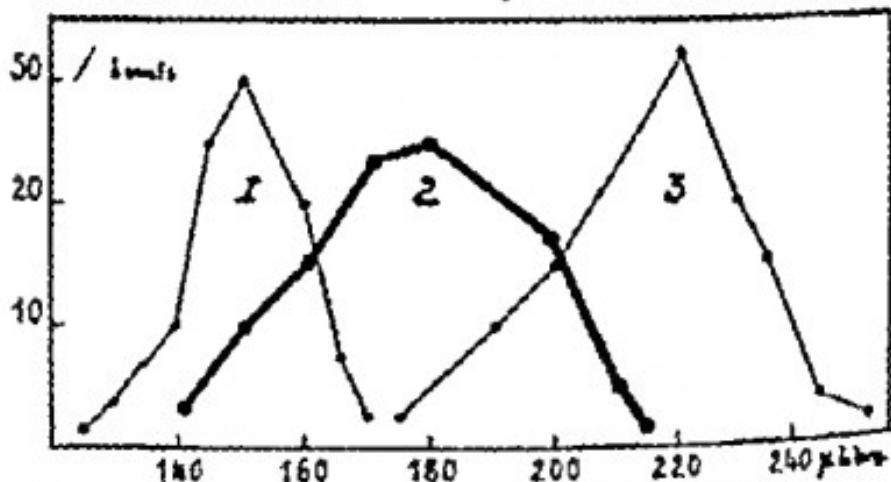
5. It has been emphasised that although the native seldom complains of symptoms due to his helminthic parasites (apart from guinea worm) there is no justification for regarding them as harmless commensals because their presence must of necessity be a constant drain on the reserves of the host.

" 8. The influence of the age of the host on the excretion of eggs of *B. haematobium*, *B. senegalensis* and *H. nelsoni* has been studied. It has been shown that during the first few years of life there is a rapid rise in the proportion of persons excreting ova followed by a fall which takes place at first rapidly and then more slowly as age advances. Evidence has been offered in support of the view that this fall operates in accordance with some natural law and that it may perhaps be associated (at least in part) with the density of the parasite population within the host.

Pisces *gigas* *pfeifferi* has been proved to be a natural intermediate host of *B. senegalensis*. *Pisces* *gigas*, *Bulimus* *schubertii*, and perhaps *Bulimus* *angolensis* being the intermediate hosts of *B. haematobium*." C. L.

VAN DEN BERGHE (L.) Sur le polymorphisme des œufs de *Schistosoma haematobium* et la présence d'œufs du type bovin dans les infections de l'homme au Katanga (Congo Belge). [Polymorphism of Ova of *Schistosoma haematobium*. Ova in Human Infection in Katanga (Belgian Congo) resembling those of *Sch. bovis*.]—*Bel. Soc. Path. Exot.* 1938, Jan. 8, Vol. 29, No. 1, pp. 41-46. With 2 figs.

When drawings and measurements were made of large numbers of the eggs of *S. haematobium* van den Berghe found much difference in the sizes and shapes of eggs a difference little evident when they were merely looked at under the microscope.



Curves showing the percentages of eggs in relation to their length. 1, in normal urinary infection in man with *S. haematobium* alone; 2, in a mixed infection in man in which eggs of both *haematobium* and *mattheei* type were present; and 3, in a case of bovine schistosomiasis in an animal with *S. mattheei* alone.

[Reproduced from the *Bulletin de la Société de Pathologie Exotique*.]

The paper makes contacts with the work of BLACKIE [this Bulletin 1932, Vol. 29, p. 401] in Southern Rhodesia, and of FISHER [this Bulletin 1935, Vol. 32, p. 239] from the Katanga area itself which dealt with terminal spined eggs of a particular kind seen in human faeces to which Fisher gave the name *S. intercalatum*. But van den Berghe's report is that in the urine of man in Katanga a like condition was seen in 6 of 176 persons who had symptoms of urinary schistosomiasis, and he gives these overlapping curves (see Fig.) regarding which comparison should be made with those which were reproduced from Fisher's paper. Van den Berghe's own conclusion is that the 3 curves are indicative of an infection with polymorphic schistosomes but that this can be settled only by infection experiments.

C. L.

CALLOT (J.) Note sur la bilharziose dans le caïdat des Nefzaoua (Tunisie) [Schistosomiasis in Nefzaoua (Tunis)]—*Ann Parasit Humaine et Comparee* 1935 Nov 1 Vol 13 No 6 pp 533-536

A note on the local distribution of *S haematobium* and *B. contortus*

C L.

BROC & MAMI (A.) Schistosomiasis intestinale [Intestinal Schistosomiasis]—*Tunisie Méd* 1935 Dec. Vol 29 No 10 pp 477-478

Intestinal infection with *S haematobium* which was possibly got at Matmata. In addition eggs and blood were present in the urine. C L

GIROLAMI (Mario) La profilassi della schistosomiasi nell'Africa Orientale. [Prophylaxis of Schistosomiasis in East Africa]—*Arch Ital Sci Med Colon* 1935 Dec. Vol. 16 No 12. pp 844-852. With 1 map

The author brings evidence from the literature to show that schistosomiasis is widespread in Italian Somaliland. Though Bulinus is not recorded Planorbis Ampullaria and Blansfordia are abundant. The vesical form of schistosomiasis is believed to exist throughout Abyssinia though to what degree is not known with any certainty. Indigenous cases have not been found in Eritrea. The usual lines of prophylaxis are recommended. Seeing that *Bulimus contortus* is present in Corsica and Sicily the author warns the authorities to be on their guard against the introduction of the disease into Italy by returning troops.

H H S

SATTA (Ernesto) Identificazione di un focolaio di bilharziosi intestinale nella colonia Eritrea. [A Focus of Intestinal Schistosomiasis in Eritrea]—*Arch Ital Sci Med Colon* 1935 Oct. Vol 16 No. 10. pp 760-762.

The patient here referred to paid a visit to Deddà Falls (torrente Deddà) down stream from Coazien and bathed in one of the pools. Soon after he complained of intense itching which continued for 10 minutes but for nearly 24 hours there was slight irritation of the inner parts of the thighs. Thirty five days later he had an attack of diarrhoea, with passage of blood and mucus 20 or more times in the day with irregular fever and profuse sweating and headache. Ova of *Schistosoma mansoni* were present in the faeces and Planorbis was found in large numbers at Deddà from which 20 days after capture living cercariae were derived in the laboratory

H H S

EGAN (C. H.) An Outbreak of Schistosomiasis japonicum.—*Jl Roy Nav Med Serv* 1936. Jan. Vol 22. No 1 pp 6-18.

An epidemic of Japonic schistosomiasis got by nearly half a ship's company from bathing in the Yangtze about 100 miles from its source.

So fixed in the lay mind is the idea that schistosomiasis in China is inevitably linked to shooting in paddy fields that when H.M.S. Sandpiper was anchored at Chunkiang in 5 fathoms of water 3 cables from the nearest shore and from the mouth of a creek and the weather was unusually hot bathing from the ship was allowed. Though as just stated the ship was 600 yards from the nearest shore the concentration (see)

E 2

of cercariae must have been great for 12 of the 18 who bathed became infected. Their case histories are given in detail. Subsequent investigation showed that the intermediate host is to be found in great abundance in the vicinity and also on the opposite bank. [This little acute epidemic got by bathing recalls the similar one of skin ankylostomiasis got by bathing in the sea at a point where a stream was discharging turbid flood water into it (ASHFORD PARKER & PARKER, this Bulletin 1934 Vol. 31 pp. 122 and 391).] C.L.

MAURITIUS COLORIS OF ANNUAL REPORT ON THE MEDICAL AND HEALTH DEPARTMENT 1ST JANUARY TO 31ST DECEMBER 1934
[KIRK (J. Balfour) Director] Appendix I pp. 42-44—
Bilharzia [ADAMS (A. R. D.) Senior Pathologist.]

A further report [see this Bulletin ante p. 94] on *Bulinus (Pyrgosphecia) forskah* as the mollusc host of *Schistosoma haematobium* in Mauritius.

B. (P.) forskah was the only snail of many species tested which exerted definite attractive action on freshly-hatched miracidia. The snails were actually seen vigorously to attack specimens of this species of. Penetration was observed *in vivo* under experimental conditions. This subsequently confirmed by fixation of snails after a short period of exposure to infestation, and section when it was seen that enormous numbers of miracidia had gained entrance into their bodies. Developmental forms of the larval stages of the worms were readily found on dissection after about two weeks in every snail of this species exposed to infestation, some recovered from snails of other species. After a period of three weeks characteristic sporocysts were found in the liver glands, containing both tailed cercariae true to type. Within twenty-eight days from initial exposure to infestation every snail so exposed was found on dissection to contain sporocysts with characteristic cercariae in large numbers, and at the end of this period usually a large number of cercariae were being emitted naturally from the affected mollusca. No other type of cercaceous cercaria has so far been found in any snails dissected at the laboratory in spite of the fact that many hundreds have been dissected during the last ten years. *Bulinus forskah* obtained from the canals which we utilize for our material has not so far been found naturally infected although a specific search on a large scale for naturally-infected snails has not yet been undertaken in places where there is a greater possibility of their acquiring the infection naturally. C.L.

- i. COOK (W. W.) Studies on Schistosome Dermatitis. I. Present Status of the Subject.—Amer Jt. Hyg. 1936 Mar Vol. 22 No. 2 pp. 349-371 [40 refs.]
 - ii. TALBOT (S. Benton) Studies on Schistosome Dermatitis. II. Morphological and Life History Studies on Three Dermatite-producing Schistosome Cercariae, *C. davis Miller* 1921, *C. ocellatus* n. sp., and *C. physostylus* n. sp.—Ibid. pp. 372-384. [16 figs. on 1 plate.] [13 refs.]
 - iii. COOK (W. W.) & TALBOT (S. Benton) Studies on Schistosome Dermatitis. III. Observations on the Behavior of the Dermatite-producing Schistosome Cercariae.—Ibid. pp. 385-396. [16 refs.]
- i. In essentials a historical survey
 - ii. Scope seen from title.
 - iii. *Cercaria davis* acts as does *C. ocellatus* of Europe but swims more vigorously. *C. davis* escapes from its snail host at night (the other 3 forms do so in the early morning) and spends most of its free life

attached to the surface film. *C. elva* swims vigorously and rests on that side of the container which is turned to the light with its tail hooked over its body and the furcae crossed. *C. physellae* rests commonly on the bottom with its tail and postacetabular parts almost at right angles to the surface on which it is resting and its furcae spread out. *C. stagnicola* hangs unattached in the water on the lightest side of the bottle.

C L

LANCET 1935 Aug 24 p 451 — Bather's Itch.

With reference to bather's itch in America (this Bulletin 1928 Vol. 25 p 948 and 1930 Vol. 27 p 459) cases of dermatitis were reported from bathers in Burt Lake Michigan but no snails were found on the beach yet when helmets were put on and search made of deep water these were seen to be present at depths of 6 to 18 feet. Since there is no way of putting to death cercariae or molluscs in large bodies of water all that it was possible to do was the marking of their beds so that swimmers were able to keep away from them.

C L

SAMY (Mostafa) Bilharzial Piles and Anal Fissure — II Egyptian Med Assoc 1936 Feb Vol 19 No 2 pp 65-71 With 5 figs.

Unless the cause of these conditions is recognized and the specific drug treatment is set going there will be constant recurrence and to him who gives the cases surgical treatment discredit.

The piles are irregular pale brownish masses of mucosa harder than ordinary piles nearly always there have been earlier symptoms of chronic proctitis and the mucus over them has in it schistosome eggs. Within them are enlarged veins perhaps with the eggs in their walls or humen. They may be a very early sign of the infection and specific treatment at once may save the patient much trouble. The fissures start as bilharzial ulcers at the anal margin and are clinically fissures with eggs to be seen in scrapings.

C L

BRUXELLES MEDICAL 1936 Jan. 5 Vol 16 No 10 pp 355-356 With 4 coloured figs on 2 plates.—Conditions chirurgicales de la bilharziose

LOVETT-CAMPBELL (A. C.) Helminthiasis Involving the Appendix — West African Med Jl 1935 Nov Vol. 8. No 4 p 15

Two patients had their appendices taken out for acute symptoms. In the first the only parasites seen in the stools were amoebic cysts and the appendix had schistosome ova believed to be those of *S. haematobium* in the submucosa. In the second the faeces showed hookworm eggs and those of *S. haematobium* and tapeworm oncospheres the appendix only threadworms.

C L

RODRIGUEZ MOLINA (R.) & PONS (Juan A.) Hematological Studies on Schistosomiasis mansoni in Puerto Rico — Puerto Rico Jl. Public Health & Trop Med 1936 Mar Vol. 11 No 3 pp 389-400 [48 refs.] [Spanish version pp 401-433]

A study of the blood of 20 cases of Mansonian schistosomiasis before treatment.

of cercariae must have been great for 12 of the 18 who bathed became infected. Their case histories are given in detail. "Subsequent investigation showed that the intermediate host is to be found in greater abundance in the vicinity and also on the opposite bank." [The little acute epidemic got by bathing recalls the similar one of cercariae *Leucostomus* got by bathing in the sea at a point where a stream was discharging turbid flood water into it (ASAROUD PARK & PARK this Bulletin 1934 Vol. 31 pp. 122 and 391).]

C.L.

**MACRITH's COLONY OF ANNUAL REPORT ON THE MEDICAL AND
HEALTH DEPARTMENT 1ST JANUARY TO 31ST DECEMBER 1933**
KIRK (J. Balfour) Director Appendix I. pp. 42-44.
BILHARZIA ADAMS (A. R. D.) Senior Pathologist.]

A further report [see this Bulletin 1934 p. 84] on *Blaus* (*Ptygophryne*) *forskali* as the mollusc host of *Schistosoma haematobium* Mauritia.

B. (P.) forskali was the only snail of many species tested which could be attracted to action on freshly hatched miracidia. The snails were actually seen vigorously to attack specimens of this species of all Penetration was observed - rare under experimental conditions. This subsequently confirmed by fixation of snails after a short period of expert infestation and section - when it was seen that enormous numbers of miracidia had gained entrance into their bodies. Developmental forms of the larval stages of the worms were readily found on dissection after two weeks in every snail of this species exposed to infestation and were reared from snails of other species. After a period of three weeks characteristic sporocysts were found in the body glands, containing well developed cercariae true to type. Within twenty-four hours free and exposure to infestation every snail so exposed was dissected and contained sporocysts with characteristic cercariae in the end of this period usually a large number of cercariae emitted naturally from the affected mollusca. No other cercariae cercaria has so far been found in any snail dissected, notwithstanding the fact that many hundreds have been dissected in the last ten years. Wild *forskali* obtained from the canals available for our material have not so far been found naturally infected although a specific search on a large scale for naturally-infected snails has not yet been undertaken in places where there is a great probability of their acquiring the infection naturally.

- i. CORY (W. W.) Studies on Schistosome Dermatitis. Status of the Subject.—*Proc. Roy. Soc. Med.* 1933, No. 2, pp. 349-371 [40 refs.]
 - ii. TALBOT (S. Benton) Studies on Schistosomes. Morphological and Life History Studies on producing Schistosoma Cercariae, *C. ocellatum* Miller *nicolaes* n. sp., and *C. physalae* n. sp.—*Ibid.* pp. 3 figs. on 1 plate. [13 refs.]
 - iii. CORY (W. W.) & TALBOT (S. Benton). Studies on Schistosome Dermatitis. III. Observations on the Behavior of producing Schistosoma Cercariae.—*Ibid.* pp. 1-10.
- i. In essentials a historical survey.
ii. Scope seen from title.
iii. Cercaria *oceanicum* acts as does *C. ocellatum* of Europe & vigorously (*C. donaldi* escapes from its snail host at 3 forms do so in the early morning) and spends most

than the potassium salt the lithium salt less so and is deserving of use. Oxyquinoline derivatives of antimony are effective and little toxic.

C L.

MONTESTRUC (E) & BERTRAND (Ch.) La bilharziose intestinale à la Martinique et son traitement par l'anthiomaline (antimoniothiomalate de lithium) [Treatment of Intestinal Schistosomiasis in Martinique by Anthiomaline]—*Rev Méd et Hyg Trop* 1936. Jan.-Feb Vol 28 No 1 pp 31-37

Anthiomaline has been successful in infection with *S. mansoni* when tartar emetic and fouadin have failed or had to be abandoned on account of syncopal attacks

Antimoniothiomalate of lithium was given intramuscularly every other day in successive doses (for adults) of 1 2 3 and 4 cc. (each cc. containing 0.06 gm.) to 29 persons eggs disappeared in 1 case after 1 injection in 10 cases after 2 in 10 after 3 in 3 after 4 and in 3 cases after 5 injections. In the 27 cases which could be examined later they were not seen again. The tolerance is described as striking. The infection is reported as giving locally so few symptoms that the people have no urge for treatment.

C L

WAGER (Vincent A.) The Possibility of eradicating Bilharzia by Extensive Planting of the Tree Balanites.—*South African Med Jl* 1936. Jan. 11 Vol 10 No 1 pp 10-11

Balanites maughamii is deadly to snails and to cercariae.

This work extends that of ARCHIBALD [this Bulletin 1934 Vol. 31 p. 114] on *B. aegyptiaca* and shows that the South African species of tree is as deadly as the Egyptian to *Limnaea natalensis* *Physopsis africana* tadpoles cercariae and fish of *Barbus* sp up to 4 in long seeing that 1 pint in a litre of water kills in 10 minutes and that dilutions of 1 in 100 000 cc. killed them in 24 hours.

It is considered that in those areas where the tree grows naturally or where it can become acclimatized the extensive planting of *B. Maughamii* around ponds vleis and dams and along streams rivers and canals is a feasible and quite practical method of eradicating bilharzia. That this should be done or that it should become a national scheme cannot, however in the writer's opinion, be advocated. For unfortunately commensurate with the eradication of snails all fish and frogs would automatically disappear as well. The upsetting of the balance of nature by this wholesale destruction of the natural enemies of mosquitoes flies, agricultural pests and noxious insects would, without doubt have disastrous and far reaching results. However as snails also carry the cercaria of animal parasites such as liver fluke the tree could be planted with advantage around small dams used for watering cattle and sheep or for bathing purposes.

C L

CAWSTON (F Gordon) The Control of Bilharzia Infection in Swaziland.—*Jl Trop Med & Hyg* 1935 Dec. 16 Vol 38. No 24 pp 305-306.

Advice as to ridding the town of Bremerdorp of infection with *S. haematobium*

It is pointed out that in 1928 schistosomiasis of sheep was eradicated at Humansdorp Cape Province and that in Bremerdorp where 1 in 3

of native children becomes infected, the same could be done there for man were the place inhabited by a docile human race. Practical advice is given and it is noted that already the association of infected pools with this disease is being impressed on the children there and that a course of injections is a popular means of cure.

C.L.

URRER (A. H.) On the Incidence of Clonorchiasis as met with in Post Mortem Examinations in Kowloon, Hong Kong.—*Chew Med Jl* 1935 Vol. 49 No. 11 pp. 1267-1288.

In 367 consecutive autopsies (289 males and 78 females) on adult Chinese clonorchis was present in 48 males of which 9 were heavy infections and in 4 females of which 1 was heavy. In no case was the fluke deemed to be the cause of death.

C.L.

KOMIYA (Yoshitaka) KAWAKI (Hirosaki) & TAO (S. C.) Study on *Clonorchis sinensis* in the District of Shanghai. I. Epidemiology of Human Clonorchiasis.—Reprinted from *Jl. Shanghai Sci. Inst.* 1935 Oct. Sect. IV Vol. 1 pp. 271-292. [43 refs.]

Faeces of 3,300 Japanese and 716 Chinese living in Shanghai in 1933 and 1934 were examined.

Examination was by a hydrochloric acid, antiformin ether method. The detailed figures are given. Incidence tends to rise with age in both nationalities and with the length of time spent in Shanghai, though among Chinese Cantonese are more heavily infected than others.

C.L.

BOLATOS (José M) KOTAI (Pedro) AXIMO (Vicente) & BASTIENO (José G) El parasitismo intestinal y la clonorchiasis en los chinos retenidos en Tiscornia. [Intestinal Parasites in Chinese at the Detention Camp, Tiscornia, Cuba].—*Rev. Peruana Clin. y Lab.* Habana. 1936 Jan.-Feb Vol. 2 No. 1 pp. 39-49. With 3 figs.

In the course of 16 weeks, between July and November 1935, the faeces of 200 Chinese immigrants were examined at the Detention Camp at Tiscornia Havana, and 130 or 65 per cent. were found to be harbouring parasites in some form. Protozoa were few, only 4 had protozoa only 14 had protozoa and helminths, and 112 had the latter only, i.e. 9 per cent. had protozoa and 63 per cent. helminths. Of protozoa *E. nassa* was found in 10 *E. histolyticus* and *E. coli* each in 3 and Iodamoeba, Giardia and Chilomastix once each. Helminthic infestations were Ascaris 94 (47 per cent.) Clonorchis 45 (22.5), Trichuris 23 (11.5) Necator 17 (8.5) *Hymenolepis nana* once only. In 18 Ascaris and Clonorchis were both present in 7 Ascaris and Trichuris and Ascaris and Necator these last three on 4 occasions, Clonorchis and Trichuris 3 these with Ascaris in 2.

H.H.S.

KOTAI (Pedro) BASTIENO (José G) ALVAREZ (Leopoldo) & LECANO (Orlando) Clonorchiasis y cancer. [Clonorchiasis and Cancer of the Liver].—*Rev. Peruana Clin. y Lab.* Habana. 1936 Mar. Apr. Vol. 2 No. 2 pp. 141-148. With 37 figs. on 23 plates.

Direct examination of the faeces of Chinese attending the Kow Loog clinic revealed nearly half to be harbouring Clonorchis, and more

recently of Chinese in Tiscornia [see above] 22.5 per cent. were passing the ova. The authors examined the livers of all Chinese coming to autopsy at the Havana mortuary 17 in number and found 4 with Clonorchis. As regards pathological changes accompanying their presence in one although the flukes were many no macroscopic alterations were observed in another they were but slight—hypertrophy of the bile ducts. Two however showed carcinomatous lesions and in one there seemed to be a causal connexion between the growth and the infestation not in the other. The macroscopic and histological changes are described in the text and for the most part well depicted in the many photomicrographs appended to the article but are not of great interest to the general reader. Those desirous of knowing more should consult the original. Suffice it to say that in the third case flukes were many the liver showed much sclerosis of the bile ducts and the interlobular connective tissue with marked cellular infiltration in the extra hepatic ducts and in the gall-bladder were signs of inflammation and cirrhosis and a primary cancer of the bile-ducts had been set up due state the authors to the irritation caused by the presence of the worms and inflammation due to the germs carried by them in a liver already cirrhotic as a result of the infestation. In the other case cancerous changes were beginning but no connexion was traceable between them and the presence of flukes.

H H S

i IDE (Kiyoshi) On a New Second Intermediate Host of *Clonorchis sinensis* Wakasagi (*Hypomedus olidus* (Pallas))—*Kitasato Arch. Experim Med* 1936. Jan Vol. 13 No 1 pp 40-44 With 1 fig [13 refs.]

ii.—Significance of *Hemibarbus barbus* (Temminck and Schlegel) as the Second Intermediate Host of *Clonorchis sinensis*—*Ibid* pp 45-47 With 1 fig

L This fish one of the Salmonidae is added to the list of larval hosts of *C. sinensis* all the others being Cyprinidae. It is a poor host but being eaten raw is dangerous.

ii. This carp is another larval host and it also is eaten raw C L

YANAGURI (Satyti) Ueber die Cercarie von *Clonorchis sinensis* (Cobbold)—*Ztschr f Parasitenk* 1935 Dec. 13 Vol. 8 No 2. pp 183-187 With 4 figs

PLOTNIKOV (N) & ZERTCHANINOV (L) [‘Fuadin-Konzentrat in the Treatment of Opisthorchiasis.’]—*Med Parasi & Parasitic Dis* Moscow 1935 Vol. 4 No 4 [In Russian pp 299-301]

The authors had previously reported the negative results of treatment of human opisthorchiasis with fuadin which however proved to be efficient in feline infections. In the present paper they describe similar results obtained in the treatment of feline and human cases respectively with Bayer's Fuadin Konzentrat. C A Hoare

DR JESUS (Zacarias) *Lymnaea philippinensis* an Intermediate Host of *Fasciola hepatica* in the Philippines with Some Observations on the Bionomics of the Parasite.—*Philippines Jl Sci* 1935 Nov Vol. 58. No 3 pp 299-315 With 8 figs on 1 plate [32 refs.]

- i. AFRICA (Candido N.) DE LEON (Walfrido) & GARCIA (Eusebio Y.)
Heterophydirosis II. Ova in Sclerosed Mitral Valves with Other
Chronic Lesions in the Myocardium.—II Philippines Islands Med.
Assoc 1935 Nov Vol 15 No 11 pp. 583-592 Walfrido
figs. (8 coloured) on 12 plates.
- ii. ————— & ————— Heterophydirosis III. Ova associated with a
Fatal Hemorrhage in the Right Basal Ganglia of the Brain.—Phil.
1936 Jan Vol 16 No 1 pp 22-26. With 4 figs. on 4 plates.

These papers are in fact continuations of that noted in this *Bulletin*, ante p. 90 in which these flukes and their ova were seen to be the cause of heart failure. As to the new papers their titles give their scope.

i. A systematic study of three infested hearts with sclerosed mitral valves involving several thousand paraffin sections made from 33 blocks carved from the different regions of the myocardium and valves, is reported in this paper. Different grades of lesion associated with eggs, ranging from acute vascular changes in the form of hyperinjection of the blood vessels and marked edema, hemorrhages in the capillaries and thrombi secondary to embolism of eggs with fragmentation of the muscle fibers affected to sclerosis of mitral valves with subsequent calcification leading to thickening and stiffening of the valvular leaflets have been found. Local fibrotic lesions of intermediate grades, such as circumscribed longitudinal oval masses of closely packed endotheliocytes and histiocytes on a great network of young fibrous tissue of various ages as well as well-formed fibrotic areas have also been encountered in the different regions of the myocardium. It would seem that the eggs of these flukes are non-toxic or non-irritating as the tissue reaction does not seem to be directed specifically against them. Reactions are evidently in the form of organization and repair to eliminate the substances spilled in their midst as a result of primary lesions such, for example, as hemorrhages, thrombi or embolism, caused by their presence in a mechanical way. It may be surmised judging from the different ages of the lesions observed, that eggs arrive in the heart in successive sublethal crops in the course of the intestinal infection by the adult flukes, during which time the valves and the myocardium receive insult after insult and hence become weakened until the heart is finally overwhelmed by a sudden massive terminal flooding of the cardiac vessels with these ova. It would thus seem, even at this stage of the investigation that the conclusion is inescapable that the heterophyids considered in this work are associated with a definite disease with an apparently distinct and definite pathology for which the name cardiac heterophylosis has been proposed. That this condition is relatively frequent in the Philippines is shown by the facts that we can continue to come under our observation and that hearts with lesions associated with eggs have been found among old museum specimens. Further studies in the subject are in progress.

ii. The occurrence of heterophyid eggs in the brain, as mentioned in our introduction, was predicted by us in our first paper (Africa, Garcia, and De Leon, 1935) and their possible presence in the spinal cord should be expected *a priori* especially considering the fact that eggs of both *Cotylospoma armatum* and *S. mansoni* (which are three to six times larger than the eggs under consideration and besides, possess cumbersome spines) have already been encountered in this portion of the cerebrospinal system. It must be recalled that the knee jerk was absent in a proportion of the cases of cardiac heterophydirosis that came under our observation. After seeing the character of the lesions we encountered in the brain of the present case we wonder if they could not be produced also by the same egg in the spinal cord thus accounting for the loss of function of this organ.

Whether or not these eggs and the lesions we attribute to them in the brain of the present case are in any way related etiologically to the total

hemorrhage in the right basal ganglia cannot be decided on the basis of our present finding. The fact is certain however that heterophyid ova can be filtered in the brain from the general circulation and cause lesions in this organ that are exactly identical to those we found in the myocardium in our cases of cardiac heterophyidiasis. There is ample evidence that the mechanism of the production of these lesions in the brain is quite analogous to that which takes place in the heart—namely plugging of capillaries and other vessels with eggs; rupture of these vessels and the attempt at organization of spilled material in which proliferated endothelial cells and histiocytes in a groundwork of fibrous tissue take a prominent part. These tissue reactions which we observed associated with eggs in the wall of the large brain clot (which presumably killed the patient) are indications that capillary hemorrhages obviously caused by the plugging of these vessels with eggs had occurred some time prior to the fatal issue. Again by looking at the character of these lesions their presence in the brain substance in the immediate vicinity of an important or vital vessel (as seems to have occurred in this particular case) may tempt one to speculate on the possibility that this condition might cause increased peripheral resistance in a state of hypertension (as was true in this case) and bring about or precipitate the fatal hemorrhage. Furthermore such lesions which may lead sooner or later to degeneration and sclerosis may possibly account for some cerebral conditions of unknown etiology—such, for example, as epilepsy, hemiplegia, aphasia, paresis, blindness, insanity etc., depending on the extent and location of the lesion. At least in further studies on heterophyid infestation of the cerebrospinal system these possibilities should not be overlooked.

C. L.

Izumi (Matsunosuke) Studies concerning a New Species of Metagonimus and its Life Cycle.—*Kitarato Arch Experim Med* 1935 Oct. Vol 12. No 4 pp 362-384 With 5 figs. on 1 plate [35 refs.]

The new species is named *Metagonimus katuradasi*; details are given of its structure and life history.

It is about 2/3 of the size of *M. yokogawai*. The points in which it is thought to be different from other allied species are given. The host species harbouring the metacercariae are 3 freshwater fish named as "Achelognathus lanceolata intermedia", *Pseudorasbora parva* and *Zacco platypus*. Infections have been caused in white rat, mouse, rabbit, dog, cat and man and eggs were present in the faeces on the sixth day in man.

C. L.

To (Sōnei) & Ko (Bun) Erfahrungen in der Behandlung der Lungen Distomiasis mit Carpaint. [Carpain in the Treatment of Paragonimiasis.]—*Taiwan Igakkai Zasshi (Jl Med Assoc Formosa)* 1935 Dec. Vol 34 No 12 (369) [In Japanese pp 2070-2076 [12 refs.] German summary p 2077]

Subcutaneous injections with 5 per cent. carpaint hydrochloride in normal saline cured two fresh cases of Paragonimiasis and improved two others who had already been treated with emetine hydrochloride. The total quantities of carpaint injected were respectively 0.3 gm over 6 days, 1.1 gm. over 23 days, 0.5 gm. over 10 days and 0.9 gm. over 30 days.

C. L.

- i. AFRICA (Candido M.) DE LEON (Walfrido) & GARCIA (Eusebio L.). Heterophydirosis II. Ova in Sclerosed Mitral Valves with Other Chronic Lesions in the Myocardium.—*Jl Philippine Islands Med Assoc* 1935. Nov Vol 15 No 11 pp. 583-582 With 2 figs (8 coloured) on 12 plates.
- ii. ————— & ————— Heterophydirosis III. Ova associated with a Fatal Hemorrhage in the Right Basal Ganglia of the Brain.—*Ibid* 1936. Jan Vol 16. No 1 pp. 22-23. With 4 figs on 3 plates.

These papers are in fact continuations of that noted in the Bulletin, ante p. 90 in which these flakes and their ova were seen to be the cause of heart failure. As to the new papers their titles give their scope.

i. A systematic study of three infested hearts with sclerosed mitral valves involving several thousand paraffin sections made from 30 blocks carved from the different regions of the myocardium and valves is reported in the paper. Different grades of lesion associated with eggs, varying from acute vascular changes in the form of hyperinjection of the blood vessel and marked edema, hemorrhages in the capillaries and thrombi secondary to embolism of eggs with fragmentation of the muscle fibers affected to scleroses of mitral valves with subsequent calcification leading to thickening and stiffening of the valvular leaflets have been found. Very fibrotic lesions of intermediate grades such as circumscribed longitudinal or al masses of closely packed endotheliocytes and histiocytes on a network of young fibrous tissues of various ages as well as well-formed scars have also been encountered in the different regions of the myocardium. It would seem that the eggs of these flakes are non-toxic or non-irritating as the tissue reaction does not seem to be directed specifically against them. Reactions are evidently in the form of organisms and repair to eliminate the substances spilled in their midst as a result of primary lesions such, for example as hemorrhages, thrombosis, or embolism, caused by their presence in a mechanical way. It may be surmised judging from the different ages of the lesions observed that eggs arrive in the heart in successive sublethal crops in the course of the intestinal infestation by the adult flakes, during which time the valves and the myocardium receive insult after insult and hence become weakened until the heart is finally overwhelmed by a sudden massive terminal flooding of the cardiac vessels with these ova. It would thus seem, even at this stage of the investigation that the conclusion is inescapable that the heterophyids considered in this work are associated with a definite disease with an apparently distinct and definite pathology for which the name cardiac heterophydirosis has been proposed. That this condition is relatively frequent in the Philippines is shown by the facts that new cases continue to come under our observation and that hearts with lesions associated with eggs have been found among old museum specimens. Further studies in the subject are in progress.

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Whether or not these eggs and the lesions we attribute to them in the brain of the present case are in any way related etiologically to the final

the infection. The fact that the incidence with the dwarf tapeworm is so much lower than that of the other infestations mentioned may be attributed to the fact that the tapeworm eggs are less resistant to environmental conditions. Human infestation is probably for the most part acquired from contamination with fresh feces of human carriers.

F) Human Infestation with the Dwarf Tapeworm (*Hymenolepis nana*) in the Southern United States.—*Amer Jl Hyg* 1936 cent in skin in pulicaria of children of the mountain districts of the southeastern part of the United States occurring up to 9-10 per cent. In all other areas and groups the incidence is much lower often being but a few per cent. Negroes have a somewhat lower incidence per cent. The ingestion of eggs from comparatively fresh feces. Group with the case that in decinormal NaOH solution partially acquisition seen it seems unlikely that the destruction of all exceptions men occurred very often. This is the assumption the same figures given which were all obtained by the use thin. C L.

An Experimental Study of Internal Autoinfection with *H. fraterculus* in White Mice—*Jl Parasitology* No 1 pp 84-87 With 1 fig

In stocks of such a kind that they could not possibly with these results.

In the above experiments the suggestion can be made that internal autoinfection with *H. fraterculus* does not occur in normal mice but may occur in mice whose resistance has been decreased by some factor as for example by bacterial infection. Further this experimental demonstration of the possibility of the occurrence of internal autoinfection under certain conditions in mice make it seem very probable that it may occur under similar conditions with *H. nana* in man. C L.

COTTRELL (F) Les oiseaux domestiques peuvent-ils héberger spontanément des hydatides échinococciques et prendre place dans le cycle évolutif normal du ténia échinocoque? (Contrôle expérimental) [Can Domestic Birds harbour Hydatids and take part in the Normal Developmental Cycle of *T. echinococcus*?]—*C. R. Soc. Biol.* 1936 Vol 121 No 6 pp 490-493.

The answer to the question in the title is no.

Two fowls 5 pigeons and 3 young turkeys were given about 400,000 scolices each into the peritoneal cavity and showed no infection 25 days to 7 months later. C L.

CARRONI (Arthur L.) Intrabiliary Rupture of Hydatid Cysts of the Liver Report of Five Cases.—*Med Jl Australia* 1935 Nov 23 22nd Year Vol 2 No 21 pp 714-724. With 6 figs.

The account and discussion of these five cases is detailed and of marked surgical interest.

Important points for tropical medicine are the need for washing the stools in cases where there is doubt an action which may bring to light a bile-stained gelatinous membrane in the pan a positive intradermal Casoni reaction in 90 per cent. of persons, the other ten per cent. having nearly all a positive complement deviation reaction while 1-2% may show the outline of cysts.

C. L.

BLANCO (R Piaggio) CAPURRO (F Garcia) & Díaz (F). Un cas humain d'echinococcosis hépatique micropolykystique isolé, observé en Uruguay [A Case of Hydatid of Liver observed in Uruguay].—*Bull Acad Med 1935 Dec 3, 80th Year, No 114 No 39 pp. 520-523 With 1 fig*

The first case of alveolar hydatid reported from Uruguay. In spite of hepatic puncture during life its discovery was only made after death.

C. L.

CATILLOTTI (F) L'echinococco della tiroide. [Hydatid of the Thyroid.—*Riv Sanitaria Siciliana* 1933, July 15, Vol 2 No 14 pp 1064-1068 1071-1072 With 1 fig. (12 mb) French summary (3 lines)]

Search of the literature has shown that hydatid cyst of the thyroid is a rare event about 0.5 per cent. of such tumours having this situation and the condition is usually discovered at operation or autopsy. The present account is that of a woman of 28 years who stated that her neck had been getting larger for two years the first noticed a local swelling the size of a hazel-nut, but it was now that of a large orange. It was cystic and appeared to be divided into two by a septum. Operation was undertaken in the belief that the tumour was a cystic goitre, but except for firm adhesions at the base was found to be easily separated and proved to be a hydatid.

H H S.

TCH. LI (E L) BAKERIAN (D A) & DIXON (E W). The Production of Artificial Immunity in Dogs against *Echinococcus granulosus*.—[A Parasitology 1936 Feb Vol 22 No 1 pp. 14-23. (22 mb)]

PEAFOLD (W J) PEAFOLD (H Boyd) & PHILLIPS (Mary). A Survey of the Incidence of *Taenia saginata*'s Infestation in the Population of the State of Victoria from January 1934, to July 1935.—[Med. J. Australia 1936 Feb 23, 23rd Year Vol 1 No 8 pp. 23-285.

Infection with *Taenia saginata* is relatively rare in Victoria, being seen mostly in Syrians infected before coming to Australia. A stronger quarantine policy and proper payment of those whose help is used are advised.

C. L.

CHENG (I L) & KANG (H J). *Cysticercosis colubriformis* in Man (Report of a Case with Very Severe Infestation, especially of the Brain).—*Chinese Med. J.* 1936 Feb. Vol 50 No 2 pp. 137-139 With 4 figs on 2 plates.

A very heavy general infection with cysticerci.

The history was mainly of mental trouble. It began 4 years earlier with headache and loss of vision but no vomiting. Then the patient

began to see ghosts. There were attacks of unconsciousness before which there was marked increase in the headache. She came to hospital for opium poisoning and died in 10 hours. Figures illustrate the weight of the infection in brain and muscles.

C L

LIPSCOMB (F M) A Case of Cysticercosis (*T. solium*)—*Jl Roy Army Med Corps* 1935 Dec. Vol 65 No 6 pp 397-400 With 1 chart.

A case of cerebral cysticercosis which was probably under observation from infection to death and so is worthy of detailed note.

A private of 21 evidently in the Rawalpindi District Punjab India, was taken into hospital with fever and body pains suggesting enteric. Eosinophils on days 6 7 11 and 18 of the infection were 3 7 12 and 1 per cent. there was severe occipital headache about day 10 soon disappearing on day 11 a tapeworm segment passed but the picture was so like enteric that no anthelmintic was given. Temperature from day 26 to day 34 was normal and tests for enteric and melintensis infections negative. A tapeworm oncosphere was seen on day 20 On day 35 flix was brought away a complete *Taenia solium*. About day 70 he was discharged, about day 83 taken in again with weakness headache and vomiting about day 105 papilloedema with loss of sight in right eye on day 113 this was worse with severe headache and vomiting on day 123 a right subtemporal decompression improved things for the time but hernia cerebri came on with fever and unconsciousness and he died on day 161 The hernia cerebri had caused abscess with local meningitis. There were 150 cysticerci scattered through the brain none was found elsewhere. C L.

MACARTHUR (W P) Cysticercosis of the Brain. [Correspondence]—*Brit Med Jl* 1935 Dec. 21 p 1229
BRITISH MEDICAL JOURNAL 1935 Dec. 21 pp 1214-1215—Cysticercosis and Epilepsy

Cysticercosis of the brain need be no matter of ready diagnosis.

Quiescence is essential for the parasite's survival but when it dies it causes symptoms by swelling and by the freeing of toxins or it may be detected by X rays through the calcification which then comes about though in the latter case this change cannot be expected till symptoms have lasted for about 3 years.

C L

DICK (John C.) Cerebral Cysticercosis simulating Epilepsy [Memoranda]—*Brit Med Jl* 1936 Feb 22. p 364

GÖGL (H.) Zystizerkose des Gehirns. [Cerebral Cysticercosis.]—*Wien Klin Woch* 1935 Nov 15 Vol. 48. No 46 pp 1417-1419 With 1 fig [17 refs.]

Two cases with brain symptoms are described in which the exciting cause is put down as *Cysticercus racemosus* described by ZEDER in 1871 parasites which have no heads. Both of these were found about the optic chiasma. There were no cysticerci in other organs and no tapeworms in the intestine.

C L

MORRISON (W. H.) Pig and Pork Cysticercosis (*Taenia solium*).—
Jl Roy Army Med Corps. 1938 Jan. Vol. 66. No. 1.
pp. 32-35

(1) Infestation of pig in South India with cysticercosis (*T. solium*) is not uncommon.

(2) Such an infestation may be from one or two parasites up to over number.

(3) Practical inspection of pig flesh should be followed up by thorough cooking.

C. L.

TRAWINSKI (A.) Über Anwendung der Präzipitationsreaktion zur Nachweis der Schweinecysticerose. [The Precipitation Reaction in the Diagnosis of Cysticercosis in Pigs.]—Zent f. Bak. I Abt. Org. 1938 Feb 13. Vol. 136. No. 1/2 pp. 116-120

A positive precipitin reaction for cysticercosis in pigs was given with an antigen made from *Cysticercus cellulosae*. The reaction is specific and is got with blood serum and muscle extract.

C. L.

LARROUX (F.) Evolution du *Cysticercus fasciolae* et injection d'extraits vermineux réaction de type sarcomateux. [Reaction like Reaction to Injection of Worm Extracts.]—Ann. Parasit. Humaine et Comparée 1935 Nov 1. Vol. 13. No. 6 pp. 529-532. With 2 figs. on 1 plate.

In 3 rats harbouring *C. fasciolae* intraperitoneal injection of worm extracts has brought about a sarcomatous reaction extract of *T. saginata* being used in 2 cases and of *F. hepatica* in one.

C. L.

MAPLESTOKE (P. A.) & RIDDLE (J. S.) Infection with *Berthella violacea*.—Indian Med Gaz. 1938 Feb. Vol. 71 No. 2 p. 81

A European boy of 5 in Fyzabad passed segments of a *Berthella*, probably *B. violacea* after being given magnesium sulphate for constipation and colic. The two other Indian cases lived in Eastern Bengal. This is the tenth case from man, for ADAMS and WEISS [this Bulletin, 1934 Vol. 31 p. 119] counted one twice. It had been reported by MCKEE [this Bulletin 1928 Vol. 25 p. 448] and merely recorded by GARDNER.

C. L.

REVIEWS AND NOTICES

ORENSTEIN (A. J.) [C M G LL.D M.D etc. Chief Medical Officer] & GORDON (A.) [F I S.E Chief Health Inspector] Notes on Elementary Hygiene, etc., for Compound Officials—68 pp With 11 folding figs 1936. Johannesburg Central Mining—Rand Mines Group Health Department P O Box 1056 [Review appears also in *Bulletin of Hygiene*]

The first issue of this book was made more than 5 years ago and during the interval not only was the edition exhausted but also a reprint. The opportunity of a reissue has been taken to review and revise the information. These notes were originally compiled to constitute a guide for compound officials in whose hands rests largely the prime responsibility of maintaining the health of the employed natives and to that end of seeing that no readily preventable violation of the canons of hygiene occurs. For this enlarged and revised edition the Chief Medical Officer Dr A. J. Orenstein has co-opted the services of the Chief Health Inspector Mr A. Gordon. The mine officials are taking an ever increasing interest in the sanitary state of the mines and the welfare of the native employees stimulated doubtless by the efforts of the Chief Medical Officer and the results of this interest have found expression in the lowered morbidity and mortality rates of late years.

The work follows the usual lines—general principles applied to local conditions. It is divided into eleven chapters. The first two briefly describing the body and its needs and the ways in which health may be maintained and disease result from their neglect. Then in succession are chapters on Housing, Waste-disposal, Disinfection (and these are supplemented by an appendix of illustrations of plans of houses, ablution rooms, latrines, refuse bins, destructors, disinfectors etc.) Food (including ration scales, the constitution of the various foodstuffs and their vitamin content), kitchen methods and the need for cleanliness therein. Short chapters deal with rat proofing of buildings, the catching and poisoning of rats, the points to note when making inspection of a compound or when choosing a site for a new compound. The terminal chapter gives a few hints to the layman on the early signs of disease among natives under his charge so that the patient may receive treatment soon and danger of spread of infection among his fellow workers be minimized. Such a work should find a ready acceptance by a wider circle than that of mine officials many of the points would apply equally in any African colony where natives are employed.

H H S

CHANDLER (Asa C.) [M.S. Ph.D Professor of Biology Rice Inst. Houston Texas etc.] Introduction to Human Parasitology Fifth Edition Rewritten and Enlarged—pp xvi+661 With 308 figs. 1936 New York John Wiley & Sons Inc. London Chapman & Hall Limited. [25s.]

It is now eighteen years since Professor Chandler first published his book on Animal Parasites and Human Disease (see this *Bulletin* 1918 Vol. 12 p 228) which was designed to set forth the important facts of human parasitology in a form sufficiently readable to appeal to a wider public than professional biologists and physicians. This wider object

failed, but instead the book has been extensively used as a textbook for introductory courses in parasitology both in academic and medical schools; therefore the work has been entirely rewritten and rearranged from the point of view. The result is a well balanced text-book on the subject which in the short space of little more than 600 pages, manages to include the main features in the life-cycles, epidemiological factors and inter relations of parasite and host in the case of the most important animal parasites affecting man together with an account of the main principles of treatment and prevention.

The book is divided into three sections of approximately equal size dealing respectively with protozoa, helminths and arthropods. For instance spirochaetes rickettsiae and the filterable virus transmitted by insect vectors are also included in the section on protozoa. The second part dealing with helminths, is of especial interest as it includes perhaps some of the most important recent advances in our knowledge of human parasitology.

The third section opens with an eloquent peroration on the importance of arthropods as disease carriers for relatively few are directly injurious but the statement that "trench fever" was the cause of more miseries among the allied soldiers during the Great War than all other factors combined is surely an exaggeration. Again this section gives an excellent introduction to the subject, but some of the figures especially those drawn from photographs, are not in keeping with the general high standard of the book.

It is difficult in a work of this magnitude to avoid the inclusion of a few slight slips such as Morenina for Noursaud on p. 52 Citharidellus for Citharus on pp. 13, 199 and 307 but it would be ungracious to dwell on any of these minor flaws in an excellent piece of work, which can be thoroughly recommended to all students of the subject.

The author pays a grateful tribute to the assistance derived from the *Tropical Diseases Bulletin* and also from the *Review of Tropical Entomology* and the *Journal of the American Medical Association* and remark that the preparation of the book could not possibly have been completed without the help of these journals.

E. R. Hinde.

MARCI (Heraldo) Membro titular da Academia Nacional de Medicina. Docente livre de Medicina. Docente livre de Medicina Tropical e Doenças Infecções. Helminthes e helminthoses do homem, no Brasil. Helminths and Helminthiasis of Man in Brazil—404 pp. With 17 coloured graphs & 69 figs. (2 coloured) 1926. Rio de Janeiro Imprensa Naval.

Though this book is largely of the nature of a compilation, the work has been carefully and conscientiously carried out and so becomes a mine of reliable information. It is divided into six main sections, apart from a brief introduction. The first condensed into 4 pages, gives notes on the technique for a study of worms—their fixation, preservation and staining. The second 120 pages describes *anthonomus* the various worms—nematodes, trematodes, cestodes and acanthocephalids which infect man in Brazil, giving in each case the synonyms with date, their characters, habitat, evolution and developmental cycle illustrated by line drawings mostly borrowed. Then follows another short section of 14 pages on laboratory methods used in diagnosis—search for ova, larvae and adults in the faeces, urine, sputum and blood. Mention is made of *Schistosoma haemotobium* and of *Paragonimus* though neither of these

occurs in Brazil. Stoll's Clayton Lane's and Praguer Froes methods of examination for ova are all described. The fourth section 4 pages only treats of serodiagnostic methods complement deviation flocculation (precipitin) and intradermal reactions. Fairley's technique for *Schistosoma* is spoken of under the first of these but his name is not referred to under the last. The fifth and longest section 140 pages takes up the clinical aspect of Brazilian helminths each being dealt with under the headings of synonymy aetiology geographical distribution the endemic index in Brazil the symptomatology pathogeny when important, diagnosis prognosis and treatment both curative and prophylactic. This part is well illustrated. The final section relates in more or less general terms without much detail the results of a ten years anthelmintic campaign from 1920-29 as gauged by patients in the Marinha Central Hospital. Figures of incidence and of infestation by separate species of worm are presented in tables and there is a series of 17 graphs depicting the incidence by single species and by combinations of species. A bibliography of 22 pages is appended, but of Brazilian literature only so that though it shows what has been done in that country or by Brazilian authors it is far from complete. There is a useful index.

H H S

MOLLARET (Pierre) *Le traitement de la fièvre jaune* [Treatment of Yellow Fever]—128 pp. (Collection Les Thérapeutiques Nouvelles.) 1936 Paris J B Baillière et Fils. 19 rue Haute feuille. [18fr]

This small book forms one of a numerous series now being published in France under the title of *Les thérapeutiques nouvelles* designed to give in precise form the most recent advances in treatment. Unfortunately in yellow fever as in other virus diseases specific chemotherapeutic treatment is lacking and all that can be done is to attempt to alleviate the various dangerous symptoms that may arise. With this end in view the book begins with a brief outline of the main clinical features of the disease. General and symptomatic treatment is then fully discussed with special insistence on the value of sugar and of large quantities of fluid which should be administered *per rectum* if gastric intolerance is so great as to prevent their being retained when given by mouth. An interesting account is given of the preparation of certain native remedies derived from indigenous African plants such as *Andropogon Schoenanthus* L. which certainly has a diaphoretic action and when boiled gives off an aromatic odour that drives off mosquitoes. The value of immune serum in treatment is also fully discussed.

The second part of the book deals with the prophylaxis of yellow fever—the measures to be taken to prevent mosquitoes biting persons attacked by the disease aerial and maritime quarantine an excellent account is also given of the present position of affairs in regard to immunization. There are one or two small errors on page 99 Low becomes transformed into Carmichael. It is perhaps unduly pessimistic to state that *la nature du virus amaril* demeure encore complément inconnue for it can now be easily grown in tissue culture its size is accurately known and its general properties conform to those of other viruses. There is no index but a full table des matières completes a very useful and instructive volume.

G M Findlay

HOPKINS (G. H. E.) [M.A., F.R.E.S., Entomologist, Department of Agriculture Uganda.] *Mosquitoes of the Ethiopian Region. I—Larval Biomics of Mosquitoes and Taxonomy of Culicine Larvae.*—250 pp. With 158 figs. 1936. London. British Museum (Natural History).

We understand that the work will be completed in three volumes, of which the second (on Anopheline adults and early stages by Dr. A. X. Evans) and the third (on zoogeography and taxonomy of adult Culicines by Dr. F. W. Edwards) will appear in 1937. It is hoped to review the three volumes together at a later date. It must suffice for the moment to deal very briefly with Hopkins' contribution which describes the ecology of mosquito larvae in Africa and more particularly the hatching of the Culicinae. A remarkable proportion of these have been described and figured. The present volume will prove of great value to those who require to identify Culicine larvae in relation to studies on yellow fever.

P. A. Rudden.

SOCIEDAD ARGENTINA DE PATOLOGIA REGIONAL DEL NORTE. Octava Reunión celebrada en Santiago del Estero 2 y 3 de octubre de 1933. [Proceedings of the Eighth Conference of the Pathological Society of Northern Argentine.] Primera Mitad. pp. 1-468. With numerous illustrations. Segunda Mitad. pp. 467-1064. With numerous illustrations. 1936. Buenos Aires. Imprenta de la Universidad.

These proceedings, collected in two volumes and together comprising over a thousand pages, are profitable for reference and an welcome addition to libraries whose readers are interested in diseases of the tropics. For those who wish to keep up to date however these volumes are issued too late. The second volume containing 55 of the 106 papers recorded has only just reached us (May 1936) although they were read at the Conference in October 1933. The first volume, except for an article on Argentine scorpions was concerned entirely with mycology. The second is by far the more important. It contains 5 articles on medical and applied entomology, 82 on pathology and experimental medicine, 7 on leishmaniasis and dermatology and the rest on human and comparative parasitology. Fortunately some of the papers have already appeared elsewhere and have been abstracted in this *Bulletin* so that by the time the full report of the Proceedings is available much of the contents are already well known. H. H. S.

DODGE (Carroll William) [Ph.D. Mycologist, Missouri Botanical Garden etc.] *Medical Mycology. Fungous Diseases of Man and Other Mammals.*—800 pp. With 142 figs. 1938. London. Henry Kimpton 263 High Holborn W.C.1 & St. Louis. The C. V. Mosby Co. 3523-25 Pine Boulevard. [42s. \$10.00.]

In his preface the author states that he presents a complete survey of the literature in this field to the end of 1933 and gives "for the first time a relatively complete and accurate bibliography of existing literature. If 'pathogenic fungi'" be substituted for "fungous diseases" in the title this becomes a fairly accurate statement of the scope of the book, for the mycological aspect completely overshadows the medical.

The first chapter is a brief account of systematic mycology on the lines developed in the well known work of GAUMANN and DODGE. Like the latter it is somewhat overburdened with the special terminology beloved of the systematist. Then follow four short chapters on Physiology of Fungi Culture Media Isolation of Microorganisms and Microscopy containing a useful account of the special technique of the medical mycologist. It is difficult to see the purpose of Chapter VI which is almost entirely a reprint of the International Rules of Botanical Nomenclature unless it is to justify the author's polemical outbursts.

The rest of the book deals with the several classes of fungi *serialim*. The classification of many of the important groups of pathogens will not receive universal acceptance and is certainly open to criticism. From the great class of Fungi Imperfecti have been removed all the genera believed to be closely related to perfect fungi : e. Ascomycetes. Thus Monilia and related genera form a family termed Eremascaceae Imperfectae the dermatophytes become Gymnoascaceae Imperfectae and Aspergillns Penicillium and related genera are all put in the Aspergillaceae leaving a comparatively small number of genera in the Fungi Imperfecti proper. Keys are given to the pathogenic species of all genera described followed by cultural and microscopical data for each fungus with usually a brief often very brief clinical account. The illustrations are all of the type found in books on pure mycology and a great many are of value only to the worker who is primarily concerned with generic relationships.

The bibliography is a noteworthy feature and occupies a large portion of the book the references for the Endomycetales alone occupying 50 pages but, in view of the completeness and accuracy of the medical references it is difficult to understand the frequent omission of references for purely taxonomic works cited in the text.

The book will prove to be a valuable book of reference for the mycologist who specializes in the study of the pathogenic fungi. It will have less appeal for the medical man who specializes in mycoses whilst for the field worker it is altogether too cumbersome and diffuse.

G. Smith

Snowman (J) [M.D. M.R.C.P. Lond.] *Manual of Emergencies Medical, Surgical and Obstetric. Their Pathology Diagnosis and Treatment.* Third Edition — pp. ix + 401. 1938. London John Bale Sons & Danielsson Ltd. 83-91 Great Titchfield Street Oxford Street W1 [10s.]

Exactly ten years have elapsed since the second edition of the Manual was reviewed in this *Bulletin* 1926 Vol. 23 p. 329. Since then many sections have been rewritten new sections have been added and more recent views on pathology diagnosis and treatment have been embodied to produce a volume containing a great deal of valuable information. At first sight it might appear to be a pocket manual but its well printed pages contain roughly no less than half the number of words as TIDY's *Synopsis of Medicine*! The criticisms offered in the review of the second edition are true of the present edition. As was then remarked

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as the author states, there is of course no direct treatment, so a paragraph immediately below some account not very well done, is given of malarial therapy in that disease. It seems a pity that what is really a valuable book should not have been more carefully planned. Nothing is said concerning the treatment of renal and biliary colic, nor how to give relief to an acute lumbo-sacral pain—presumably these are not emergencies—yet we are told that in discussing the pathology of these diseases (nephritis) modern writers have adopted the term nephritis to describe the glomerulus with its associated vessels and renal tubule. Some idea of the scope of the book will be gained by looking at the Contents.

Dangerous emergencies in disease of the respiratory system—haemorrhage obstruction etc. Heart—syncope auricular fibrillation, angina or myocarditis, thrombosis etc. Nervous system—cerebral haemorrhage and thrombosis meningitis encephalitis coma convulsions, fracture of the skull etc. Convulsions. Gastro-intestinal tract—haemorrhage obstruction acute peritonitis etc. Urinary organs—haemorrhage retention suppression. Poisons. Emergencies in midwives.

H. S. Stannus.

Ogilvie (W. H.) M.D. M.Ch. F.R.C.S. *Treatment of Fractures in General Practice* 2nd Edition Vol. I pp. viii+1-108. With 27 figs. Vol. 2 pp. vi+109-180. With figs. 28-37. Pocket Monographs on Practical Medicine. F cap. 8vo. 1936. London: John Bale Sons & Danielsson Ltd. 83-91 Great Titchfield Street W.1. [2s 6d each volume.]

The issue of this most useful set of publications continues and the popularity of the work on Fractures is evidenced by the necessity for another edition. The subject of fractures and their treatment is one which comes within the purview of every man in general practice, and among those working in tropical countries with growing and developing industries accidents may constitute a no inconsiderable part of their duties and the prompt and correct treatment of fractures is all important. There is no need to speak in detail of the advantages of these Pocket Monographs suffice it to say we are here presented in the handiest possible form with the method of choice of treating practically any form of fracture which the practitioner is likely to encounter. In the first volume the author devotes half of the 108 pages to general principles and the rest to fractures of the upper limb and shoulder girdle; in the second he deals with the lower limb and pelvis, and the thorax and spine all in 72 pages—a model of succinct writing. The only omissions are fractures of the head—skull and face-bones—and the jaw. It is a little surprising that fractures of the nasal bones and mandible are not dealt with for early correct treatment of the last is an essential to obtaining good results.

H. H. S.

BUREAU OF HYGIENE AND TROPICAL DISEASES

TROPICAL DISEASES BULLETIN

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[No. 8.

HELMINTHIASIS

KELLER (A. E.) & LEATHERS (W. S.) The Incidence and Distribution of *Ascaris lumbricoides* *Trichuris trichiura* *Hymenolepis nana* and *Hymenolepis diminuta* in Thirty-Six Counties in Kentucky.—*Amer Jl Hyg* 1936. Mar Vol. 23 No 2. pp 216-230 With 2 maps & 1 fig [13 refs]

Examination was of 0.005 gm. of faeces in decinormal caustic soda solution from 23 964 specimens. Ascaris incidence in the mean was 34.7 per cent. (16.6 to 40.8) Of positive cases 23.2 per cent contained unfertilized eggs only, 24.75 fertile eggs only and 51.98 both. This infection was often familial. [Since their real infection rates will not be got by this method for trichuris and probably not for the two tapeworms the figures need not be given] *Clayton Lane*

RAFAEL RISQUEZ (Jestis) Parasitismo por *Ascaris lumbricoides* verificado en Caracas (en 25 000 análisis) [Prevalence of *A. lumbricoides* in Caracas]—*Gac Med de Caracas* 1935 Nov 30 Vol. 42 No 22 p 347

During the period 1932-35 the author has made at the Ministry of Health laboratory 25 000 examinations for *Ascaris*. Of the total, half were children 20 per cent men and 30 per cent women. In 1933 and 1934 the percentage found infested was 46.0 and 44.8 respectively and in part of 1935 45.3 per cent. [Unfortunately the method of examination is not stated] *H H S*

ALICATA (Joseph E.) Early Developmental Stages of Nematodes occurring in Swine.—*U S Dept of Agric Washington Technical Bull No 489* 1935 Dec 96 pp With 30 figs. [143 refs]

In this publication facts reported on the eggs of *Ascaris lumbricoides* from the pig are important for human medicine

It was noted by RANSOM & FORSTER in 1920 that the embryo undergoes a moult while within the egg. Alicata's suggestion is that till that moult has taken place the larva does not become infective. In his experiments with guineapigs there were no lesions and no larvae in the lungs so long as the first moult had not taken place, that is up to 15 days culturing at 33°C. At 16 days 10 per cent. of embryos were in the first moult and there were in the lungs 5 *ascaris* larvae (1936)

and several petechial haemorrhages at 17 days 50 per cent of embryos were in the first moult 16 larvae were seen in the lungs, which were moderately congested at 18 days 90 per cent. of embryos were in the first moult, 28 larvae were seen in the lungs which had heavy congestion. About 4,000 eggs were fed to the guineapigs at a time. [The importance of the paper is that in the evidence for modes of transmission collected in this *Bulletin* 1934 Vol. 31 p. 675, the eggs have the reviewer thinks always been described in the original papers merely as "embryonated," but even so they need not in the light of Alcata's work have been infective.] C. L.

DE BOER (E.) Experimentelle Untersuchungen ueber Ascaris hochcordes des Menschen und des Schweines. [Research on Ascaris of Man and Pig.]—*Ztschr. f. Infektionskr. d. Haustiere*. 1935. Vol. 49, No. 4 pp. 249-259 [41 refs.]

In experiments made on sucking pigs with ascaris eggs from pig and man, worms of full development have been grown from eggs coming from both sources, a fact speaking for the physiological identity of the two forms. Infection took place with difficulty on a diet poor in vitamin A.

Before the birth of the piglets search by a Koloid and Barber technique using a saturated solution of common salt [e.g. 1,200] was made with a view to seeing that the mother's faeces contained no ascaris eggs. Even if they did not do so she was treated once, generally with oil of chenopodium, and if they did she was treated till the faeces were egg free. At the same time care was taken to keep the pens free from this infection.

Feeding was by eggs which had been cultured for at least 2 months at 26°C. in 1 per cent formalin solution that they had in them embryos was seen through the microscope and that they were infective was made sure by infection of guineapigs.

Each of a litter of 9 was given on one occasion 100 to 10,000 eggs of ascaris from the pig, there was no development of worms 2 months later. Each of a second litter of 5 was given on one occasion ascaris eggs from man in two which had had 750 and in two which had had 10,000 eggs there was no development, in one which had had 37 there were 25 worms. In a third litter of 7 fed on more than one occasion with eggs of pig ascaris the number of eggs given and of worms seen later were respectively 35,000 and 4; 450,000 and 22; 30,000 and 32; 530,000 and 31; 35,000 and 95; 30,000 and 1; and 35,000 and 45. In a fourth litter of 7 fed on more than one occasion with ascaris eggs from man the corresponding figures were 6,800 and 2; 7,300 and 9; 6,800 and 0; 7,300 and 2; 402,000 and 2; 235,000 and 1; and 7,300 and 1. As to poverty of vitamin A, 7 sucking pigs whose mother was taking food poor in this were each given 21,000 ascaris eggs from the pig with no development of worms, and 5 of another litter of a similarly treated sow were each given 37,000 eggs of ascaris from man with development of 1 worm among them all. As to controls, in 5 of one litter kept under the same careful conditions but not fed on ascaris eggs, there was no infection, but in 13 of another litter whose mother was left heavily infected and with whom they were left till they were 44 days old two were without worms, and the others had from 1 to 41 when 2 to 3 months old.

C. L.

MAPLESTONE (P. A.) & MUKERJI (P. K.). An Improved Technique for the Isolation of Ascaris Eggs from Soil.—*Indian Jl Med Res* 1936. Jan. Vol. 23 No 3 pp 667-672.

An attempt to determine the degree to which a modification of the Caldwell's technique for recovering ascaris eggs from soil was in fact successful.

The Caldwell's method [this *Bulletin* 1928 Vol. 25 p 959] consists in the thorough mixing of infected earth with an antiformin solution the eggs being then floated in sugar solution of a high specific gravity. Maplestone and Mukerji made a suspension of faeces of the consistency of gruel strained it through a fine wire sieve shook the filtrate well estimated its egg content by Stoll's method, and added 2 cc. of it to 10 cc. of earth. This culture was set aside for about 3 weeks. In the first experiments 10 cc. of 30 per cent. antiformin were added to the culture there was frequent stirring and then an addition of

20 cc. of saturated salt solution [if of a solution of common salt the whole fluid would have a s.g. of about 1.143] practically no eggs were recovered. It being judged that this was the effect of the low s.g. of the diluted fluid, the other preparations after frequent stirring in the antiformin solution in which they remained from 3 to 24 hours were allowed to stand the fluid pipetted off the soil removed to D.C.F. tubes saturated salt solution added [presumed s.g. about 1.200] and the whole subjected to D.C.F.F. after which the percentage of eggs recovered varied from 0 to 25.1 [average 5.54]. When the cultures were broken up in D.C.F. tubes the antiformin being in contact with them for 1 hour only when they were centrifuged when the fluid was pipetted off and replaced with saturated salt solution and when the whole was subjected to D.C.F.F. the percentage of eggs recovered was between 0.17 to 33.2 [average 6.5]. When cultures were frequently stirred in water chlorine gas was bubbled through the suspension for 10 minutes the preparation centrifuged the fluid pipetted off and saturated salt solution put in its place no eggs were recovered in eight experiments. When the culture was mixed with 10 cc. of 2.13 per cent. caustic soda (its strength in antiformin) stood for half an hour and chlorine gas was bubbled through it the percentage of egg recovery was—from cultures which had remained moist throughout 16.9 to 51.1 [average 32] and from cultures which had dried before being put in the caustic soda solution 2.4 to 32.4 [average 15].

[It may be thought from the wording used in the paper that the reviewer has advised a saturated solution of common salt for the floating of ascaris eggs. He has not. On the contrary the evidence he has offered [this *Bulletin* 1928 Vol. 23 p 261] is that the actual average collections of ascaris eggs from solutions of watery consistency having different specific gravities (and got by D.C.F.F. from the same quantities of a centrifugal precipitate of the same faecal suspension 30 to 61 days old) were as follows 203 for s.g. 1.150, 2,400 for s.g. 1.200, 2,748 for s.g. 1.250 and 3,431 for s.g. 1.300 and were not bettered by higher specific gravities of the floating fluid. In addition it needs note that embryos do not develop in ascaris eggs kept for these periods under water though they do so in earth and that if hookworm work is a guide embryonated eggs will not commonly float in any solution however heavy. Then again, to moisten embryonated ascaris eggs which have dried is the surest way to cause hatching [this *Bulletin* 1929 Vol. 26 p 548] and the embryos do not float

unless it is by accident. It follows that the methods suggested above cannot be depended upon to show the real infectivity of a soil sample, and needs note that the authors do not say they can, though the ordinary reader may well draw from the wording the conclusion that they do.¹

C.L.

MAYER MAY (Jacques) Réflexions à propos de deux cas d'ascariasis [Two Cases of Ascaris Infestation].—*Bull. Soc. Méd.-Chirurg. Ind. Chinoise* 1935 Sept. Vol. 13. No. 7 pp 851-862. [25 refs.]

In the first case an ascara escaped into the peritoneum through the necrotic wall of the gall bladder in the second through a rent in the intestine caused by the host being run over by a car

C.L.

DE EMPERATRIZ (J. R. Hernandez) Obstrucción intestinal causada por ascarides.—Reprinted from *Roc. Soc. Vida Quindinse & Zulia* 1935 Sept. Vol. 9 No. 9 8 pp [28 refs.] French summary also in *Gac. Vida de Cárdenas* 1935 Dec. 31 Vol. 42 No. 4 p. 369-373 [25 refs.]

CARBONELL & SALAZAR (A.) & RODRIGUEZ & REYES (C.) El examen radiológico de la ascariasis intestinal y su importancia quirúrgica. [Radiological Diagnosis of Intestinal Ascariasis and Surgical Importance].—*Arch. Nacres* 1936 Jan. 15. Vol. 2 No. 1 pp. 83-94 With 3 figs. [36 refs.]

The authors describe their technique as follows: An opaque "barium" meal is administered to the fasting patient and half an hour later the first radiograph is taken, the second in an hour and thereafter hourly till the head of the barium column reaches the cæcum, the final one when the whole has passed from the small intestine. The radiographs are taken with the patient lying on his back. The fluoroscope is used as a control for taking the radiographs at the best times. If the worms are numerous a single picture will usually suffice. The examination is valuable also where only males or unfecundated females are present and no eggs are found in the faeces. From the surgical point of view it is of value in preventing unnecessary operative procedure when a patient comes under observation for obscure abdominal symptoms.

The authors state that Taeniasis is similarly demonstrable.

H.B.S.

MAY (J. Meyer) Ascariasis et radiologie.—*Bull. Soc. Path. Exot.* 1935 Feb. 12 Vol. 29 No. 2 pp 141-145

VASSILKOVA (Z.) Dehelminthization of Faeces containing the Ova of *Ascaris lumbricoides*.—*Med. Parant. & Parant. Dis. Moscow* 1935 Vol. 4 No. 4 pp 288-296. [In Russian]

The author describes the results of experiments upon the action of various chemicals upon ascara eggs. These were isolated from the uterus of the female worms into glass receptacles, covered with Barbagallo's fluid and incubated at 34°C. The effect of the chemicals was tested on unsegmented eggs, those in the stage of 4 blastomeres and on eggs containing a fully-developed embryo both in pure culture and mixed with faeces. After subjecting the ova to the action of the

chemical in the incubator they were centrifuged, washed in saline and again placed in the incubator. The effect of the treatment was judged by the subsequent appearance and viability of the eggs and embryos. The following proved to have no effect upon the eggs

silver water (water filtered through silver bearing sand) chlorinated water (Cl content 28 to 450 mgm. per litre) and 50 per cent creolin solution acting for 3½ hours. The development of the embryos was retarded by 5 per cent creolin (5 hours) 4 per cent carbolic acid (5 hours) 5 per cent lysol (3½ hours) creosote 1:120 (5 hours) 10 per cent caustic soda and 20 per cent chloride of lime after prolonged exposure. Complete destruction of the eggs was effected by the following 5 per cent carbolic acid (5 hours) 10 per cent lysol (5 hours) 2 per cent cresole (3 hours) creosote 1:60 (5 hours) 2 per cent mixture of sulphuric acid (1 gm.) cresole (1 gm.) and water (48 gm.) (5 hours) while quick lime and chlorinated water (650 mgm. Cl per litre) had a rapidly fatal action.

C A Hoare

LANDE (P) & SIGALAS (R.) Ascaridiose et médecine légale. [Ascaris Infestation and Forensic Medicine]—*Gaz hebdo Sci Méd de Bordeaux* 1936 Feb 9 Vol. 57 No 6 pp 82-84

A child of 5 died with convulsions vomiting and diarrhoea and poisoning was suspected. Autopsy showed a mass of 19 ascaris about 20 cm. above the ileo-caecal valve and no trace of poison. C L.

LAWSON (Paul D) & BROWN (Harold W) Methods of testing the Anthelmintic Properties of Ascaricides—*Amer Jl Hyg* 1936 Jan. Vol. 23 No 1 pp 85-103 With 1 fig [41 refs]

A report on *in vitro* and *in vivo* tests against *A. lumbricoides* from the pig by hexylresorcinol 6-hexyl-m-cresol O-heptylphenol santonin carbon tetrachloride tetrachlorethylene chenopodium and thymol.

The thoroughly washed worms were placed in normal saline in 400 cc. beakers the fluid being held at a temperature of 37°C and kept mixed by a power-driven glass propeller from which the worms were kept away by a gauze screen. The drug tested was added in quantity enough to form a 1 in 1 000 solution or suspension. Death was judged to have taken place if a worm did not show definite motion in both directions when dropped into water at 60°C. As to determination of stools negative for eggs the three methods most generally used for this are direct centrifugal flotation which is the most accurate for a determination of absolute negativity flotation [by which from the reference to the literature seems to be meant direct gravity floatation] and the dilution egg-count we have come to the conclusion that the Stoll egg-count is of great practical value in determining the efficiency of drugs against ascaris hookworm and whipworm. We have been impressed by the value of a study of the percentage of negative cases after treatment as an index of anthelmintic efficiency.

We are of the opinion that both *in vitro* and animal *in vivo* anthelmintic tests are of great aid in determining the probable action of a drug in man. *In vivo* anthelmintic tests in animals as those on dog Ascaris in testing a human ascaricide are simple and usually effective. The maintenance of large numbers of dogs is, however very expensive. *In vitro* tests on the other hand, are inexpensive and allow observation of the effect of drugs on

the worm which cannot be carried out *in vivo*. *In vitro* methods are of great value for orientation experiments especially where a large series of related compounds are to be studied.

The final test of any anthelmintic is its action against that parasite in which one is interested in its normal host. For such a test in human ascariasis and hookworm disease the Stoll egg-counting method is our choice.

The need for thorough study of the pharmacological action of new drugs before their use in man is emphasized. Ascariasis and hookworm disease are not usually fatal diseases thus safety should be the primary requisite of any anthelmintic."

The Table shows the results obtained. [Those of tannin are of interest in confirming the findings of TAKAHASHI & ASADA that it is not tannin which kills ascaris but some substance which the host's body makes from it. The authors do not mention this point but it is the really essential one in judging of the extent to which *in vitro* experiments are of any real value in grading anthelmintics. Nor in the consideration of the action of thymol in man do they make much of the evidence suggesting that in its case too the body of the host alters it to something else so that, if that is so, its action *in vivo* is no proof of its anthelmintic worth in man nor for that purpose do they refer to the essential need of its proper participation.]

C.L.

Rossi (J. E.) La calciocianamide nella lotta contro le strongile (Ricerche sperimentali). [Calcium Cyanamide in combating Ankylostomias]—Arch. Ital. Sc. Vet. Color. 1933 Oct. Vol. M No. 10 pp 715-721

The disinfectant and vermicidal action of calcium cyanamide has been proved in the laboratory but the author here reports experiments carried out by him on prepared plots of ground to imitate as nearly as he could natural conditions.

He took three small portions of land 4 by 6 metres, separated by netting. The grass was removed and the earth broken up a little. A culture of larvae of *A. caninum* was sprinkled on two of these, one was left thus and on the other was distributed the cyanamide mixed with street dust in the quantity employed in agriculture, 900 gm. on the experimental area, equivalent to 4 quintals per hectare. On the third were placed the faeces of dogs passing *A. caninum* in quantity—the faeces had been collected for 6 days and kept in the cold to prevent development, then mixed with straw and left for 3 days in the open (temp 24°C.) to develop next this was mixed with 8 gm. cyanamide per kilogram of "manure," about the proportion used in agriculture. Two dogs, which repeated examinations had shown to be free from ankylostomias, were then placed on each plot, and their faeces examined.

Those on the control plot were passing typical ova on the 3rd and 41st days respectively those on the second (where the cyanamide had been sprinkled directly on the ground) were passing ova in small numbers from the 45th day those on the third (with the mixed faeces and cyanamide) were never found positive. On the 60th day an anthelmintic was given to all six, and the two on the control plot passed 68 and 92 hookworms, those of plot 2 none, one on plot 3 none, the other 7. A few days later another examination revealed that those on the control plot were still passing ova, but none of the others.

Calcium cyanamide would, therefore appear a good disinfectant for infested land but, as the author rightly points out, experiments such as these cannot quite imitate natural conditions, for there the distribution of the cyanamide is not likely to be uniform, nor would it all directly reach the soil and thence the larvae would not be evenly distributed.

H. H. S.

ERRATUM.—Vol. 33 No. 2, p. 111 in first line of summary of paper by STEVENS & BROWN on the destruction of hookworm eggs and larvae for cyanide of calcium read cyanamide of calcium.

LEATHERS (W. S.) & KELLER (A. E.) Investigations concerning Hookworm Disease in Southern States with Suggestions for Continued Control.—*Southern Med. J.* 1936. Feb. Vol. 29. No. pp. 172-177 [11 refs.]

The paper's title is the measure of its range. The hookworm is still a cause of danger and damage in these parts.

There are set out the facts which were collected by the Rockville Sanitary Commission in 1910 to 1914 which were based on fecal smears from 205,825 persons of which 41.8 per cent. were positive. Side by side with these are those of examinations made by the authors by the Stoll-Hanbeek egg counting method using 0.005 gm. of feces from 106,577 persons, of whom 14.1 per cent. were positive. A table converts egg counts into worm loads on a regular scale whatever the load, an action which HILL's work (this Bulletin 1927 Vol. 24 p. 193) shows to be wrong, but fortunately in all other tables the counts themselves are given. It is difficult to determine at what intensity of hookworm infestation clinical symptoms are likely to appear but for practical purposes an infestation of 2,600 eggs per c.c. of feces, or approximately 100 hookworms, is found to be the level at which symptoms will probably occur. [RAMSAY's words on this problem (*ante* p. 551) are] The work of such authorities as Stiles and Lutz has amply proved that even the very lightest infections with hook worm have a deleterious effect on the individual. As to the egg-worm ratio if the mean weight of the stool is taken as 100 gm. and the total egg output for a single female Necator taken as 10,000 eggs, then 100 Necators half of them females will give 5,000 eggs per gram of stool. Perhaps the mean stool is taken as being of over 200 gm. but note is not made of this important point. To the method of diagnosis used South Carolina showed the highest percentage of infected persons and the largest egg counts but with the low percentage of infected persons in Tennessee of 6.9 there were persons with high egg counts. It is shown in addition that hookworm infection is often a family problem [yet another pointer to defecational infection] and that when one member is found infected the others should be examined. These are their suggestions for continued control.—

Proper excreta disposal has not been observed uniformly. However the Federal agencies have cooperated with state and local health organizations in field operations for building sanitary privies. The emphasis which is now being placed upon this phase of rural sanitation should greatly accentuate the value of proper excreta disposal.

In discussion it was pointed out by Dr. D. G. GILL that even now a number of rural schools are serving as disseminators of hookworm as well as of learning, and in closing Dr. KELLER said "After an analysis

of the data from counties with full time health departments and counties without full time health departments we were not able to determine that there was any difference in the rate of decrease in the incidence of hookworm

C L

KELLER (A. E.) LEATHERS (W S) & JENSEN (M H.) An Investigation of Hookworm Infestation in Thirty-Six Counties of Kentucky—*Amer Jl Hyg* 1936 Jan. Vol 23 No 1 pp 33-45 With 3 maps.

Continued reductions in the incidence and intensity of hookworm infestation can only be brought about by the application of sanitary measures which will be effective in permanently preventing the transmission of this parasite. It would seem since there is such a low general intensity level that treatment except in areas of high incidence would not be very effective in bringing about the desired results. Provision for proper excreta disposal and careful sanitary supervision and maintenance would seem to offer the most rational solution of the problem. This would be effective also in preventing the transmission of the other intestinal parasites.

There are certain areas of high incidence of hookworm in Kentucky where on account of the economic status of the population it would be necessary to depend on treatment in great measure to improve the health of individuals residing there. Under these conditions treatment could be used as a stimulus to arouse interest in this problem and to obtain the cooperation of the people. It is likely that where this was done permanent measures could be eventually instituted.

The studies should be extended especially in the localities where the incidence of hookworm is highest. These relatively small areas at the present time are the ones most in need of systematic programs of control by the official health agencies. If control measures could be more uniformly carried out it would be possible to practically eradicate hookworm in Kentucky.

C L

OTTO (G F.) Localized Centers of Hookworm Disease in Kentucky and North Carolina.—*Amer Jl Hyg* 1936 Jan. Vol. 23 No 1 pp 157-168. [15 refs]

Over 6 000 persons were examined in the States noted in the title and the results are set out.

Examination was by Stoll's egg counting method and hookworm infection is still a problem. This is shown for example by comparing the 3 counties in which faeces were examined in 1914 by smear by the Rockefeller Foundation with the figures now got in these same counties their respective percentages of infection being 83.1 and 48.4 36.9 and 19.6 56.8 and 33.3. The county percentage of incidence now varies from 0 among 78 persons examined (from 2 counties) to 54.7 among 872 and 58.3 among 824 in 2 other counties. The mining communities have less infection than the general thus varying from about 11 to 13 per cent. Women out of their teens are more often infected and have higher egg counts than men of the same age period. There are hookworm families. In Columbus County 27.3 per cent. of 815 rural whites showed infection to the method of examination used against 12.3 per cent. of 716 negroes while school children showed 34.4 per cent. as against 37.9 per cent. in 1914. Details of two heavily infected families are given one of which had frequently moved to escape persecution by health and school authorities and the other had thrown away the carbon tetrachloride given them. A relatively small

Calcium cyanamide would, therefore, appear a good disinfectant for infested land, but, as the author rightly points out, experiments such as these cannot quite imitate natural conditions, for there the distribution of the cyanamide is not likely to be uniform, nor would it all directly reach the soil, and thirdly, the larvae would not be evenly distributed.

H. H. S.

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In discussion it was pointed out by Dr D. G. GILL that even now a number of rural schools are serving as disseminators of hookworms as well as of learning, and in closing Dr KELLER said "After an analysis

CRUZ (W O) Sobre a significação da eosinophilia na ankylostomose.
 [The Significance of Eosinophilia in Ankylostomiasis.]—*Mem Inst Oswaldo Cruz* 1936 Vol. 31 No 1 pp 1-10 [15 refs]

The author has investigated the presence of eosinophilia and its degree in different stages of hookworm infestation. The eosinophilia found early is associated with migration of the larvae. Later it is due he maintains to heterologous albuminous substances secreted by the worms in the intestine and believes that withdrawal of eosinophile cells from the circulation to the local site leads by stimulation of the bone-marrow to stronger haemopoiesis at least increase of leucocytes and this stimulation continues as long as the helminthic secretion persists Even though the anaemia is cured the eosinophilia may persist on account of these heterologous albumins. H H S

WALTERS (A. H) under the direction of G Carmichael Low & P H MANSON BAHR. Treatment of Ankylostomiasis in Indian Seamen.—*Lancet* 1936. Mar 14 pp 599-600

A confirmation of the digestion of worms after an anthelmintic seeing they are not found in stools though eggs are no longer present, a comparison of the value of D C F with the smear and of the worth of certain anthelmintics.

Of the 37 cases in question and in whom infection was in fact displayed by D C F the faecal smear was negative in 28 worms were recovered in 6 only When seen again 5 to 12 months later eggs were present in 2 of 8 cases in which treatment had been by thymol in 2 of 6 cases in which it had been by oil of chenopodium in 2 of 6 cases by carbon tetrachloride and in none of 17 cases given a combined treatment of the two last consisting of 40 minims of carbon tetrachloride and 15 minims of oil of chenopodium of unstated ascaridole content the drugs given separately in gelatin capsules. It is suggested that the infections were got in childhood that the worms had become embedded in the wall of the small intestine and that the reappearance of eggs was due to relapse and not to fresh infections [see however this *Bulletin* 1935 Vol. 32 p 208] No cases had been discharged as dewormed until the faeces had been free of eggs for at least 7 days after treatment C L

PORTUONDO DEL PINO (A.) & FERMOSELLE BACARDI (J J) Contribución al tratamiento de los casos graves de ankylostomosis. [Treatment of Severe Ankylostomiasis.]—*Rev Parasit Clin y Lab* Habana 1936 Jan-Feb Vol. 2. No 1 pp 99-103

The author records the case of a woman admitted to hospital suffering from enteric fever a month after her confinement. When the temperature became normal she was noticed to be very anaemic and examination of the stools revealed hookworm ova in large numbers 10 or more per field [apparently by direct examination]. She was given 30 drops of oil of chenopodium in castor oil. A fortnight later there was no improvement ova seemed to be just as numerous haemoglobin was still 15 per cent. only and her general state was very poor. She was given a blood transfusion of 200 cc. and improved. Six days later she was given by duodenal sound 30 cc. Necatocida Kuba in castor oil (Necatocida Kuba has a basis of oil of chenopodium and CCl_4) A week later ova were fewer and a second dose of the Necatocida was given and after 7 days examination showed one or

two ova in some fields, in others none. Later a third dose was given also by duodenal sound, and since then no ova have been seen. The author maintains that in very severe cases of hookworm infestation, the correct procedure is transfusion of blood and administration of the antihelmintic by duodenal tube.

H. H. S.

CAMEROON (G. R.) & KARUKARATNE (W. A. E.) Carbon Tetrachloride Cirrhosis in Relation to Liver Regeneration.—*Jl. Path. & Biol.* 1938, Jan., Vol. 42, No. 1, pp. 1-21. With 14 figs. (13 in colour, on 5 plates) & 1 chart. [84 refs.]

Our object in this paper is to describe experiments with carbon tetrachloride designed to throw some light on the relationship of repeated liver damage to the development of cirrhosis. Information on the pathology of acute and chronic carbon tetrachloride poisoning is also brought forward, and regeneration is studied.

The first object of the paper is not, the second and third are of great direct interest to those who give hookworm treatments. The note is limited to the points of direct interest. The experiments were made on albino rats with an average weight of 150 grams, the drug being given hypodermically to nearly all of them. With a single dose the smallest amount causing histological change in the liver (the minimum toxic dose for rats) was 0.018 to 0.033 cc. per kg. of body weight. Facts giving proof of regeneration were of two sorts. First directly histological, nuclei being giant, or mitotic, or there being more than one in a cell—unusual arrangement of liver cells, growth of new bile ducts—and seeming increase of fibrous tissue but the appearance being in fact due to death and absorption of parenchymal cells. Second the taking away at operation of half to two-thirds of the liver—a loss made good in the normal rat in 14 days. And the aseptic grafting in a healthy rat of some of its liver into its omentum, where the structure of the graft undergoes no change in 14 days.

After a single toxic dose of carbon tetrachloride there is little evidence of change in the liver except for diffuse congestion, until between the fifth and twenty-fourth hours. Hydropic and fatty degeneration then appear in the liver cells of the central and mid-zonal regions of the lobules. The extent of the degeneration and its tendency to pass on to necrosis depend on the size of the dose. The altered cells map out a complicated lobular pattern. The damaged areas are soon invaded by leucocytes and especially by histiocytes, the Kupffer cells of the unaffected parts becoming more prominent and perhaps contributing to the increased cellularity. By the third day removal of damaged and necrotic liver cells is proceeding, laying bare the mesenchymal supporting stroma and the sinusoids. Repair is going on actively chiefly through mitotic division of the healthy liver cells not only at the borders of the areas of necrosis but diffusely throughout the organ. The portal canals frequently contain more cells including lymphocytes, histiocytes and some fibroblasts. By the seventh day the dead tissue has been removed. Repair is complete by the fourteenth day. At no time is there any sign of bile-duct proliferation.

There is no need to put out in detail the outcome of doses given in series to rats, but this footnote is important—

"One of us (W.A.E.K.) has personally investigated in Ceylon a case of severe liver damage following rapidly repeated therapeutic doses of carbon tetrachloride together with ehenopodium. The liver showed extreme fatty degeneration while the kidneys were intensely congested."

Though such a series of doses at short intervals is rarely given to man, yet the effect of these on liver regeneration in experimental animals has this lesson for those who give one dose only to man —

During the pre-cirrhotic stage between the sixth and twenty first doses the liver reverts to normal on discontinuing the drug because the liver cells can still proliferate actively and make good the damage produced up to this stage. Later on since its cells are becoming less capable of proliferating and of repairing any damage the liver as a whole is less capable of a return to normal on removal of the toxic agent. It is added

Through the action of a number of widely varying toxic agents there results destruction of liver cells

[That is to say it seems to be the case that should one of these toxic agents be at work when a dose of this drug is given the giving of it may take the liver over the line limiting possible regeneration with death as its outcome] The point is made that rats receiving repeated doses of carbon tetrachloride differ in the recuperative power of their livers. [This is the experience after one dose in man.] There is a valuable review of the literature C L.

BOULOS (A.) Clinical Observations on Carbon Tetrachloride Poisoning —*Jl Egyptian Med Assoc* 1936 Jan Vol 19 No 1 pp 20-33

A résumé of the literature with this conclusion from personal experience —

"In my experience the rate of mortality differs widely in different districts. In a locality like Mit Ghansur with heavy infection besides the many cases that showed symptoms of intoxication, there are on record three fatalities amongst the few thousand cases treated in the last three or four years. At the same time in Beni Suef with an extremely low percentage of both ascaris and *Schistosoma mansoni* infection no case of death was reported and nobody showed any marked symptoms of intoxication during the last ten years

DERRVILLE (P.) L'intoxication expérimentale par le tétrachlorure de carbone. Données générales et recherches personnelles —*Jl Méd de Bordeaux* 1936 Feb 10 Vol 113 No 4 pp 91-102. With 2 figs. [32 refs.]

GARCIA (E Y) & AFRICA (C M.) *Diphyllobothrium latum* (Linnaeus 1758) Lübeck 1910 in a Native Filipino —*Philippines Jl Sci* 1935 Aug Vol 57 No 4 pp 451-457 With 3 figs. on 1 plate [11 refs.]

The first case of this infection reported from the Philippines. A Filipino boy of 7 died of anaemia. The parasite was then passed. Past active helminthological surveys in the Philippines have never shown the infection. It occurred in a town where *Cyprinus carpio* was introduced 8 years ago C L.

KOURI (Pedro) BASNUEVO (José G) & ARENAS (Rogelio) Contribución al conocimiento del ciclo evolutivo del *Strongylodes stercoralis* (Nota previa.) [The Cycle of Evolution of *Strongylodes stercoralis*] —*Rev Parasit Clin y Lab* Habana 1936 Jan-Feb Vol 2 No 1 pp 1-6 With 13 plates & 1 fig English summary

It is stated that during faecal culturing for 8 months there were obtained many generations of the parasite *Strongylodes stercoralis*

the later ones producing only rhabditiform larvae and egg-bearing females which have become parthenogenetic. At the same time intrauterine eggs become fewer and fewer. [It will be remembered (FAUST this *Bulletin* 1934 Vol. 31 p. 129) that the parasitic stages are after all not parthenogenetic, so the suggestion that this condition occurs in the free stages will hardly be accepted on the evidence offered.]

C.L.

KOURI (Pedro) & SELLEK (Antonio) Sobre el tratamiento de la strongyloidosis por el violeta de gentiana. [Treatment of Strongyloidiasis Infestation by Gentian Violet].—Rev Paranaense Clin. y Lab. Habana. 1936. Jan.-Feb. Vol. 2. No 1. pp. 7-16.

At the Municipal Hospital for Children Havana, among 154 children whose stools were examined during a period of 14 years in the latter half of 1935, 15 were passing larvae of *Strongyloides stercoralis*. Previous methods of treatment—with oil of chenopodium, male fern carbon tetrachloride thymol, santonin with infusions of emetin and arsenicals alone and combined—had proved ineffectual. Seven of the 15 have been treated with gentian violet, 1 or 2 drops daily, each containing 0.06 gm. according to age—the dosage being regulated as 1 c.c.m. daily for each year of age. The effect of treatment was controlled by macroscopical examination of the faeces. In 3 of the 7 patients larvae disappeared within the week and did not reappear in 2. 1 of whom received the dye for 8 days, the other for 10 days. Larvae were still being passed, so after a week's interval the dye was resumed and in 3 days more larvae were no longer seen. Two suffered from nausea and vomiting but not severely. The dye had no action on hookworm, trichuris or ascara.

H.B.S.

BEACH (Ted de Vinne) Experimental Studies on Human and Primate Species of Strongyloides. V. The Free-living Phase of the Life Cycle.—Am J Hyg. 1938. Mar. Vol. 23. No. 2. pp. 17-277. 22 refs.

The experiments deal with *Strongyloides nelsoni*. Perhaps the following is of importance for man.—

Free-living adults of the first, second, and third generations were found in artificial culture media. Filiform larvae were produced through 3 generations as well as eggs and rhabditiform larvae of the fourth generation. An actual count made of 1 culture at the termination of the experiment showed 629 offspring present, a number which would be expected from 4 first generation and 8 second generation females. The continuation of the sexual free-living cycle is believed to occur normally in nature under optimum conditions. Attempts to transplant larvae and adults to fresh culture media were unsuccessful." C.L.

CHESTER (See C.) Studies on the Nature of Immunity to Intestinal Helminths III. Renewal of Growth and Egg Production in *Leptothrix* strongyloides after Transfer from Immune to Non-Immune Rats.—Am J Hyg. 1938. Jan. Vol. 23. No. 1. pp. 48-51. With 1 fig.

OTTO (C. F.) Blood Studies on Trichuris-infected and Worm-free Children in Louisiana.—Am J Trop Med. 1935. Vol. 15. No. 6. pp. 693-704. (34 refs.)

There is nothing to make for the belief that trichuris infection is the cause of any change in the blood picture.

Faecal examination was by the Stoll Hausheer method [which uses 0.005 cc. of faeces] and in most of those in whom no eggs were seen by it D.C.F. was used in addition.

The blood picture was studied in 550 rural white children 5 to 14 years old in south-central Louisiana. Of these 197 were infected with trichuris 140 with trichuris and some other intestinal worm usually ascaris and 213 were worm free. The blood picture was essentially the same in all groups i.e. 11.22 to 11.52 grams haemoglobin per 100 cc. blood 4.5 to 5.0 million erythrocytes per cmm. blood mean corpuscular haemoglobin of 23.0 to 23.7 micro micrograms and a relative lymphocytosis of 46.4 to 47.2 per cent. These children are known to suffer from under nourishment and it is suggested that most of them both parasitized and worm free suffer from a nutritional anaemia.

C L

BATTAGLIA (Alberto) & ARATA (Esteban C). Anemia perniciosa por tricocéfalos trichiurus. [Pernicious Anaemia and Trichuris Infestation.]—*Prensa Méd Argentina* 1936 Apr 29 Vol. 23 No 18. pp 1094-1101 [15 refs.]

A case is recorded of an Italian woman 29 years of age who had suffered for some 6 months with vague abdominal pain attacks of vomiting increasing pallor and emaciation. Her blood contained 1,870,000 red corpuscles and 2,800 leucocytes per cmm. haemoglobin 60 per cent colour index 1.6 there was marked anisocytosis poikilocytosis with megalocytes and erythroblasts. No malaria parasites were found the W.R. was negative in fact the only cause discoverable was the presence of *Trichuris trichiura*. The anaemia slowly cleared up after treatment the details of which are not given H H S

UJHE (N) On Acute Appendicitis connected with Intestinal Parasites.—*Taiwan Igakka Zasshi* (Jl Med Assoc Formosa) 1935 Nov Vol. 34 No. 11 (368) [In Japanese pp 1773-1789 With 10 figs on 1 plate. [67 refs.] English summary pp 1789-1790]

The author examined macroscopically and microscopically 330 appendices removed for acute appendicitis in Taihoku a subtropical part of Formosa. Twenty three or 7 per cent. showed signs or actual presence of helminthic affection 20 with Enterobius 2 with Trichuris and one with Ascaris. In four of the Enterobius cases the Ascaris and one of the Trichuris cases apart from mere irritative and traumatic lesions of the mucosa there was invasion by bacteria and definite inflammatory changes. The former has been named by ASCHOFF *Appendicopatina oxyterica*

H H S

HEATHMAN (Lucy S) Laboratory Diagnosis in Trichinosis.—*Amer Jl Hyg* 1936 Mar Vol. 23 No. 2. pp 397-409 With 2 charts. [23 refs.]

After reviewing the relevant literature on this subject the authors analyse the results of intradermal and precipitin tests obtained in 55 patients who contracted trichinosis in 7 different outbreaks. Only one case was fatal.

The technique employed in the preparation of antigen was similar to that of BACHMAN (1928) for both precipitin and skin tests and in 26 instances antigens supplied by Bachman as well as those prepared (1934)

in the local laboratory were used. In performing the skin test in 100 the immediate type of reaction described by ACCORDING & TIEZI (1932) was observed in only a limited number of cases no observations on the delayed reaction made.

In 22 out of 44 cases (50 per cent.) the skin tests showed an immediate positive reaction. In only 22 patients was a delayed reaction looked for it was present in 11 (50 per cent.) Of these 7 had also no immediate reaction. In 22 children used as controls none gave positive reactions. Precipitin was present in 30 out of 42 sera, i.e. 68.2 per cent. the majority reacted to a 1 in 6,000 dilution of antigen. An eosinophilia of 10 per cent. or more was noted in 93.2 per cent of cases and in 39 persons it exceeded 20 per cent. In the one fatal case infected 38 days previously blood collected 4 days before death showed no eosinophilia the skin test was also negative, but the precipitin test was strongly positive.

Only 13 out of 30 heavily infected guineapigs gave positive skin tests (i.e. 43.3 per cent.) and these appeared from the 7th to the 45th day. Only 3 out of 30 gave a positive precipitin test.

The author concludes that though precipitin and skin antibodies occur in quite a high percentage of trichinosis patients, the reactions are not sufficiently early or regular to be of great diagnostic aid. They are less frequent in experimentally infected animals than in man. Eosinophilia muscle biopsy and the study of suspected meat are regarded as of more value from the viewpoint of laboratory diagnosis.

V Hamilton Fairb

DIAZ MARTIN (Luis). Consideraciones sobre varios casos de tricinosis [An Outbreak of Trichiniasis].—*Uniones Potosí Coladas*, Vol. 2, 1936. Feb. Vol. 8 No. 2 pp 75-88. [10 refs.] [Summary appears also in *Bulletin of Hygiene*.]

The outbreak recorded here occurred in San Martín de Trizaga, Cáceres in December 1935 twenty-one individuals were attacked members of one family and their friends and infection arose from ingestion of pork sausages made at home for a family celebration. The ages of the patients ranged between 2 and 56 years. The symptoms were typical and eosinophilia was present in nearly all, ranging between 6 and 40 per cent. but two who presented other characteristic symptoms had no eosinophilia 1 per cent. only. One of these, a woman of 20 years, showed facial oedema and muscle pains increased by pressure the other a woman of 44 years, suffered from debility shivering and chills, intense lumbar pain and facial oedema. The incubation period that is the interval between the time of ingestion and the appearance of the first symptoms [the early irritant symptoms were absent at all events no mention of them is made] was 15-20 days. All showed fever but in most slight, and lasting for 5-8 days. There was marked insomnia in the early stages, later equally persistent diarrhoea. Attempts were made to obtain embryos in the blood by withdrawing 10 cc. from a vein between the fifth and eighth days of illness. To the blood was added 100 cc. of 3 per cent. acetic acid and the mixture centrifuged and washed several times with the acetic acid serum were made of the deposit and stained by Giemsa, but no embryos were found. Treatment by purgation and thymal was tried and for the adults neosalvarsan in an initial dose of 0.15 gm. and increasing with administration at four-day intervals. The milder cases received

only the former and for the muscular pains sodium salicylate. Examination of the local pigs showed a high percentage (6) of infestation

H H S.

ALICATA (Joseph E.) Infectivity of *Trichinella spiralis* after Successive Feedings to Rabbits [Abstract.]—*Jl Parasitology* 1935 Dec. Vol. 21 No 6 p 431

Experiments were performed which involved the passage of non-lethal doses of trichinae every 32 days from two rabbits to two other rabbits until 7 pairs of rabbits were used. The initial strain of larvae was obtained from experimentally infested guinea pigs. The muscles of rabbits receiving the seventh generation of trichinae were heavily infested with larvae. The virulence of the larvae was not diminished as a result of their passage through rabbits seven times in succession since a guinea pig and a rat fed lethal doses of these larvae died of intestinal trichomosis 4 days after feeding. During the past 7 years the writer has passed a strain of trichinae from guinea pig to guinea pig about once every two months. On 3 or 4 occasions the strain was passed through a rabbit and again transferred to guinea pigs. The above findings are at variance with those of Bachman and Oliver (1934) who found that a strain of trichinae passed from rabbit to rabbit 20 days after infection died after the fifth feeding. Bachman and Oliver assumed that the worms lost their virulence and numbers due to successive passages through rabbits. The present writer is of the opinion that Bachman and Oliver did not allow enough time for sufficient larvae to reach the infective stage in the muscles of the rabbits and that repeated feedings of fewer and fewer infective larvae to successive rabbits gradually reduced the number of infective larvae the final feeding being entirely negative.

VIRGO (Flavio L.) Triquemosis experimental en la rata. [Experimental Infestation of Rats with *Trichinella*.]—*Bol Inst Clin Quirurg Buenos Aires* 1935 Vol. 11 Nos. 97-98-99 pp 336-350 With 21 figs. & 3 plates. [f2 refs.]

The author carried out two sets of experiments. The source of his material was the diaphragm of a pig heavily infested with *Trichinella spiralis*. In the first experiments he fed the animals with the muscle finely divided and mixed with bread and milk and then at intervals killed them and examined the tissues microscopically. In the second another series was fed with part of the same material after it had been 22 days in an ice-chest. Histological details of the findings are described briefly in the text and clearly depicted in photomicrographs. The worm was never found in the lymph tissue of Peyer's patches nor in the lymph glands but was seen in the gland pits of the mucosa by the fourth day. Many of the rats succumbed within the first week and showed ulceration and necrosis of the intestinal mucous membrane. At the end of the second week these lesions had practically healed, but the females with packed uteri were seen at the bottom of the glands together with some free embryos. The surrounding tissue contained many eosinophiles. At the same time embryos were found in the heart blood and the striated muscle fibres. This invasion of the muscles appeared to go on for a week or so the embryos being about 120μ long by $10-12 \mu$ broad. During the succeeding 10 days they double and may even treble in size and are becoming encysted and

in 20 days after invading the muscles or 40 from the time of ingestion they are encapsulated. Thereafter the cyst begins to calcify or disintegrate.

H H S

McCoy (O. R.) The Development of Trichinae in Abnormal Embryos.—*Jl. Parasitology* 1936, Feb. Vol. 22, No. 1, pp. 54-59

"When sterile larvae of *Trichinella spiralis* were injected into the membranes of living chick embryos or into the amniotic sacs of rat embryos, a small percentage of them developed to the adult stage. The rate of growth in rat embryos was the same as in the normal intestinal environment, but in chick embryos it was somewhat retarded. Development of trichinae also occurred in the lumen of the uterus of pregnant rats, but when larvae were injected into non-pregnant uteri, they were rapidly killed. In a few animals it appeared that normal migration of young trichinae to the muscles of the mother rat took place from female worms which had developed in the uterus. A small series of female rats showing natural immunity to a second infection with *Trichinella* larvae given by mouth failed to manifest any significant immunity in the uterus." C L

TRELLER (Hans) & ACOTTERIDGE (Donald L.) Zur Frage der immunologischen Diagnose der Trichinose. *Ztschr. f. Path.* L. Abt. 09, 1935. Nov 15. Vol. 135 No 4/5 pp. 294-309. [23 refs.]

O'CONNOR (F. W.) & HERZ (Constance R.) Studies in Filariasis L. in Puerto Rico.—*Puerto Rico Jl. Public Health & Trop. Med.* 1935. Dec. Vol. 11 No 2 pp. 167-272. With 28 figs. [20 of 16 plates] & 13 charts. 42 refs. [Spanish version pp. 273-307]

These studies were put through at intervals during 1929-1930 and 1931 and their scope covers general as well as local problems.

The worm in question is *Wuchereria bancrofti* and the insect is *Culex fatigans*. The infection is highest in the northern part of the island with its more abundant ground water and greater moisture in the air and in other places where movement of air is poor. Mosquitoes are bred freely in barrels used for collecting rain water from roofs in the swamps which are present round every town and in irrigation ditches within them. Screening of houses is rare, either because it cannot be afforded or because it makes them too hot. On the other hand all persons are completely clothed, only head, hands and ankles being unprotected from mosquitoes. The worst shacks have at least two rooms, overfilled with families of six or more, and there filaria is abundant and *C. fatigans* is seen sheltering behind clothing and under beds. Laundresses bring wet clothes into the house, so making an atmosphere suitable for *Culex*. As is seen from cases and histories given, the infection is often one of the family with infected mosquitoes found in and under the house itself. The biting time of *C. fatigans* is the evening and early part of the night, that is to say well before the microfilarial wave in the blood is at its height [a fact which must need a readjustment of the ideas regarding the value of periodicity for the survival of the worm species].

The peak of the microfilarial wave is at no really fixed hour. In the same man on two occasions it was reached at 2 a.m. and 4 a.m., and in 3 brothers at 1, 1, and 5 a.m. There is made a close study of the clinical signs and the conclusion that "each case requires careful individual study and that the efficacy of therapeutic or surgical measures depends on locating the active center of the disease. And there is stress on mental sequelae (for deaths from suicide have a high

place) and on economic loss. O'Connor's method for making serial sections on a great scale is clearly put forward and the pathology is closely described and freely illustrated in a section which will repay detailed study. Differential counts on a large scale have been made both two-hourly ones in relation to the microfilarial wave in the blood and others made daily and both show a striking inverse relationship in the numbers of polymorphs to lymphocytes. Filariasis and leprosy often occur together for both are common in the overcrowded dwellings of the poor. These are points which seem the most important to the reviewer but the report on this very large piece of work must be read itself by those who wish to get the best from it. C L

TISSEUIL (J.) *Filaire de Bancroft en Guyane statistique rôle pathologique [Filaria in Guiana]*.—*Bull Soc Path Exot* 1936 Jan 8 Vol. 29 No 1 pp 47-49

A statistical study comes to the conclusion that the presence of filariae as shown by microfilariae with nocturnal periodicity has no influence at all on the appearance of elephantiasis or lymphangitis.

Examination of over 300 cases by THÉZÉ & LEGER in 1916 and 1917 gave a microfilarial percentage of just under 28. The author's examination of 241 cases gave a positive percentage of 18.6. He concludes that the incidence is falling. The youngest found infected was a girl of 8. The infection is not familial nor one of the town. Of 20 cases of elephantiasis 5 showed microfilariae and of 15 cases of lymphangitis 3 did. Lymphadenitis is rare. C L

SANZ ASTOLFI (J.) *La filariasis en el Norte de Marruecos [Filaria in Northern Morocco]*.—*Medicina Paises Cálidos* Madrid. 1936. Jan. Vol. 9 No 1 pp 16-25 With 3 figs.

Dr Gonzalez an ophthalmologist sent to the author a worm extracted from the eye of a patient who had come to consult him. This proved to be an adult *Loa loa* and examination of the blood revealed an abundance of embryos. The infestation had been acquired in the French Congo. A short time after the author found embryos of *W. bancrofti*. This patient was a native of Tangier where he had always resided, occasionally paying brief visits to Gibraltar. His father however had been to the tropics and it may be that the son had been infested from the father. Later a third case also a *bancrofti* infection, came under the author's observation a native of Cadiz who for the last 8 years had lived in the neighbourhood of Morocco at first in Tetuán then in Tangier. It is thought (1) that patients become infected by troops returning from the tropics and staying in Gibraltar (2) that cases are probably more numerous than is generally believed for the above showed no symptoms clinically indicative of filarial infestation, and (3) that spontaneous cure may occur.

H H S

TEICHLER (G.) *Mikrofilaria bancrofti in Bauchzyste und Hydrozyste. [Embryos of W. bancrofti in an Abdominal Cyst and a Hydrocyste]*.—*Arch f Schiffs- u Trop Hyg* 1936. Jan. Vol. 40 No 1 pp 32-34

A description of 2 cases and a note on the action of drugs on microfilariae *in vitro*.

The first case was one of an abdominal cyst behind the peritoneum evidently lymphatic in nature volume 3 litres fluid clear and brownish yellow sg 1.015 containing many characteristic *M. bancrofti*. There were none in the blood but in this there was a secondary anaemia, with eosinophils 12 rising later to 20 per cent. There were no adult worms in the wall of the cyst. There is no mention of any examination for enlarged lymph glands.

The second case is of hydrocele the only one seen among hill tribes though they are common in those living in the plains. It contained many *M. bancrofti*.

Microfilariae were killed in a quarter of an hour *in vitro* by 0.001 gm. methylene blue 0.005 gm. quinine, or 0.005 gm. atekrin per cc. of fluid and within half an hour by 0.008 neosalvarsan, 0.01 turcine of antimony, 0.001 trypaflavine and 0.02 Tr. Iod. Techler notes good effects from high doses of quinine in acute inflammatory elephantiasis. C.L.

HUA (Z. M.) Chronic Filaria of the Spermatic Cord. Report of Three Cases.—*Chinese Med. J.* 1936, Jan., Vol. 50, No. 1 pp. 40-45

Three cases of chronic filariasis of the spermatic cord are described. It appears that the condition has not before been reported in Chinese literature. The adult worms were found in sections of excised material. A note adds information as to a fourth case. Microfilariae might or might not be present in the blood. C.L.

IYENGAR (S. O. T.) Entry of Filaria Larvae into the Body Cavity of the Mosquito—*Parasitology* 1936, Mar., Vol. 28, No. 2 pp. 190-194 With 3 text figs. & 7 figs. on 1 plate.

It is from the cardiac portion of the midgut and in the proventriculus that microfilariae enter the perivisceral cavity of the mosquito.

Iyengar worked with *Culex fatigans* and *W. sclarifer* bancrofti and with *Aedes vexans* (*V. vexansoides*) annulipes and *Filaria malaysi*. When a mosquito sucks blood containing microfilariae the worms that pass up the oesophagus tend to stay in the cardiac portion of the midgut immediately behind the proventriculus. In the narrow lumen the microfilaria holds itself against the current of the blood feed by forming strong loops against the wall of the gut." It travels forward to the proventriculus where it has been seen within an hour of feeding.

It would appear that the microfilaria penetrates through the wall of the gut near the proventriculus or in the proventriculus itself, and escapes into the perivisceral cavity of the thorax "leaving its sheath behind it. No worm-larvae were seen in the haemocoele of the abdomen, although they were fairly common in the haemocoele of the thorax. In many instances worms were seen in the perivisceral cavity and in between the muscle bundles within an hour and in a few cases within 20 min. of feeding. It appears that penetration is at an end within 2 hours of feeding. Actual penetration of the wall of the proventriculus was not seen. It is believed that a microfilaria which has come into the "stomach" does not have much chance of entry into the body cavity of the mosquito. Those which do get into the haemocoele of the thorax make their way between

and into muscle fibres. The paper was received for publication on 30th August, 1935 and published on 17th April 1936.

[Specimens covering much the same ground were shown by O'CONNOR & BEATTY at a Laboratory Meeting of the Royal Society of Tropical Medicine and Hygiene held on 19th March 1936 and noticed in the *Lancet* on 4th April 1936. There were marked differences between what was seen in them and the conditions reported by Iyengar. The number of the Society's Transactions in which their descriptions will appear is still in the printer's hands.]

C L

AUGUSTINE (Donald L.) & DRINKER (Cecil K.) The Migration of Microfilariae (*Dirofilaria immitis*) from the Blood Vessels to the Lymphatics.—*Trans Roy Soc Trop Med & Hyg* 1935 Nov 25 Vol. 29 No. 3 pp 303-306 With 3 figs. on 1 plate.

1. An experiment is reported in which microfilariae (*Dirofilaria immitis*) have been injected into the circulation of an uninfected dog.

2. It has been shown in both donor and recipient that microfilariae readily leave the circulation and enter lymphatics. No evidence of a cellular reaction on the part of the host has been found in relation to living microfilariae.

C L

HINMAN (E. Harold) Attempted Reversal of Filarial Periodicity in *Dirofilaria immitis*.—*Proc Soc Experim Biol & Med* 1936 Jan. Vol. 33 No. 4 pp 524-527 With 2 graphs.

In two infected dogs lighting and feeding times were reversed for 11 days. These results cannot be taken as a true reversal of periodicity although the daily maximum has been moved forward about 6 hours. However they do confirm the statement that alteration of daily routine exerts an influence on periodicity.

C L

DARRIBA (Antonio R.) Oncocercosis americana. [Onchocerciasis in America].—*Medicina Paises Cálidos* Madrid. 1935 Dec. Vol. 8. No. 12 pp 561-573

A general review of the subject of onchocerciasis pointing out that the disease has been known to exist in Guatemala since 1915 when ROBLES first described its presence there and in Mexico since 1923 on the evidence of FILLEBORN. As a general article much of it is taken up with an account of the condition in Africa, its symptoms, mode of transmission diagnosis and treatment.

H H S

RODHAIN (J.) & GAVRILOV (W.) Un cas de localisation profonde de Microfilaria volvulus. [Embryos of *O. volvulus* in the Deeper Tissues].—*Ann Soc Belge de Méd Trop* 1935 Dec. 31 Vol. 15 No. 4 pp 551-560 With 9 figs. on 4 plates. [14 refs.]

Microfilaria volvulus was found in numbers in the connective tissue of certain organs and in blood capillaries.

The material was from the body of a leper woman. Microfilariae were numerous in the connective tissue of the mammary gland rare in the spleen rarer still in the kidney absent in caseous lymph glands about the bronchi and in the mesentery but present in the connective tissue about the latter present in the blood capillaries of the liver and in fair numbers in its periblobular connective tissue. They were

as numerous in the connective tissue of the "cubital nerve" as is the mamma. The failure of others to find them in deep connective tissue is noted.

C. L.

MICHAELIS (P.) Ein Fall von Onchocercosis rotulus bei einem Deutschen in Kamerun.—Arch f Schiffs- u Trop Hyg 1936, Jan. Vol. 31, No. 1 pp 29-32. With 8 figs.

LINDBERG (K.) Remarques sur l'épidémiologie de la draconitose dans l'Inde britannique. Un plaidoyer en faveur de recherches [A Plea for Investigation of Dracontiasis in India].—Bull Soc Path. Exot 1935 Nov. 13, Vol. 28, No. 9 pp 896-897 [15 refs.]

A report on uncompleted work, its purpose being to put forward points on draconitiases which are in need of being cleared up.

The work was carried out in the Deccan. Two new cyclopses are named but no details of structure are given in this paper though they will be in another journal. They are *C. multicolor* whose death takes place after only one guineaworm larva has made its way into it, and *C. remyi* which is, with *C. leuckartii* a good larval host here. The need for more detailed work is seen when the point is made that in the endemic area there is at least one village where those living there have not even knowledge of the infection and where both these cyclops species are present in numbers. One possible explanation is seen in the experience of another village in which most men had had infection with the worm—in 1932 the steps of the step well were taken away and a wall put up round it, and the village is now free from infection.

C. L.

LINDBERG (K.) Arthrites suppurrées du genou dans la draconitose et arthrites suppurrées cryptogénétiques. [Joint Suppurations associated with Dracontiasis].—Rev Afr d Med et Hyg Trop 1935 Sept.-Oct. Vol. 27 No. 5 pp. 215-230.

A report on 12 cases of aseptic suppuration of the knee in regard to which the author's belief is that they were caused by the guinea worm.

This arthritis may make its appearance before the worm does, and inflammation is put down as the probable result of a toxic excretion from it or it may be a synovial reaction from the worm's movements, or the worm may discharge larvae into the cavity of the knee. In endemic regions such suppurations are held to be draconitiastic even when no worm is seen, and they occurred in 10 of 30 cases where there was a guineaworm near the knees.

C. L.

SAYAD (W. Y.), JOHNSON (V. M.) & FAUST (E. C.) Human Paratickation with *Gordius robustus*.—Jl Amer Med Assoc. 1936, Feb. 8, Vol. 106, No. 6, pp. 481-482.

A tumour in the eyelid became inflamed and was cut out. It was a gordiid worm believed to be *Gordius robustus* and to be the first certain case from man. It was small and sexually immature.

C. L.

DELBET (Pierre) Sur la nocivité du pain blanc [The Harmfulness of White Bread (in Connexion of Gongylonema and Cancer in Rats)]—*Bull Acad Méd* 1936 Feb 11 Vol 115 No 6 pp 267-271

Before accepting gongylonema as itself able to produce cancer in rats a connexion worked out by FIBIGER, diet deficiencies in magnesium and vitamin A must be taken into account.

FIBIGER fed his rats on white bread alone and thus diet will itself produce some thickening of squamous epithelium. Gongylonema produces no lesions in rats fed on a good diet but in those fed on white bread it produces cancer. White bread has little magnesium and little vitamin A. Which of these deficiencies taken together with gongylonema, is the cause of cancer is unknown C L

DI AICHELBURG (Ulrico) I fenomeni immunitari nelle elminiasi. [Immunity in Helminthiasis.]—*Giorn Ital di Malat Esot e Trop* 1936 Apr 30 Vol 9 No 4 pp 67-70 73-5 77

A general review of the subject dealing with natural and acquired immunity with serum reactions anaphylaxis and the antigenic properties of worms. There are no new facts brought forward but the paper is well documented with nearly 200 references. These are referred to by number in the text but unfortunately are not listed at the end of the paper. A note states that the bibliography will be published in the extracts but as it stands the value of the article is much reduced by its absence. H H S

SCHUTZ (R. E) & SCHICHOBALOWA (N) Immunität bei Wurm invasionen. [Immunity in Helminthiasis.]—*Med Parassit & Parasitic Dis* Moscow 1935 Vol 4 No 4 [In Russian pp 257-280 German summary p 280]

A detailed review of the present knowledge regarding immunity in helminthic infections. C A Hoare

LEPROSY

LEPROSY REVIEW 1936. Apr Vol. 7 No. 2 pp. 51-99 With 3 figs. on 2 plates. Quarterly Publication of the British Empire Leprosy Relief Association 131 Baker Street, London, W.1. [5s.]

The only original paper in this issue is a brief historical note on Leprosy in England with a list of 40 leper houses in Devon and Cornwall in 1307.

J. W. LINDSAY also contributes a translated abstract of the report of a Brazil Conference on Treatment of Leprosy published in the *Revista de Leprologia de São Paulo* June 1935. Montel's methylene blue treatment was discussed and very varied conclusions come in, none of the investigators being as enthusiastic as Montel, late toxicity varying, and even one fatal accident being reported, in addition to improvement in infiltrated lesions and ulcers and the relief of neuralgic and reactions the results on the whole were not very encouraging, in spite of the great affinity of the drug for the diseased tissues, but further trials are indicated. Rattlesnake antivenene and osmic acid were advocated in the treatment of leprotic "algias," or reactions. The antivenene was injected subcutaneously twice daily into or near the painful spot, up to six or eight injections. Osmic acid was given intravenously in 2 cc. doses of a 2 per mille solution on alternate days up to 5 to 10 doses, and in all of eighteen cases the pains disappeared. The treatment of eye complications was also discussed, but no advance appears to have been recorded.

L. R.

BRITISH EMPIRE LEPROSY RELIEF ASSOCIATION. ~~Worse than blind~~
being the Annual Report for 1935.—36 pp. With 8 figs. London
131 Baker Street, W.1

This report contains a record of useful work throughout the Empire. A new feature of this is the supply of a number of voluntary workers by Toc H, who were trained at the Livingstone College to fit them to assist the medical officers of leper settlements in Nigeria by relieving them of much routine work. The Medical Secretary carried out a tour in the West Indies and British Guiana, reports of which have already been dealt with in this *Bulletin*.

KEDROWSKY (W. I.) Modern Aspects of the Epidemiology of Leprosy.—*International Journal of Leprosy* Manila 1935. Oct.-Dec. Vol. 1 No. 4 pp. 443-451

This is a theoretical paper based largely on the assumption that recent work regarding a virus stage of the tubercle bacillus can safely be applied by analogy to the leprosy organism. The author discusses hereditary transmission but decides against it. He states that MUN and ROGERS point to mosquitoes as possible transmitters of leprosy in tropical countries, whereas they only suggested that the derived lesions produced by biting insects might admit of the entrance of lepra bacilli in those exposed to infection. The author suggests that the infective agent may enter through the nasal mucous membrane without producing local lesions and pass to the lymphatic system, and that the lepra bacillus may make an abrupt mutation outside the body into some resistant form of a hypothetical nature.

L. R.

LEPROSY IN INDIA 1936 Jan. Vol. 8 No. 1 pp 1-41 With 1 fig Issued quarterly by the Indian Council of the British Empire Leprosy Relief Association

Two original articles are included in this number one being of local interest in recording further notes on the anti-leprosy work in the Salem district of Madras where 42 clinics treat 3,217 patients every month about 25 per cent. of the patients attending regularly. The incidence of the disease has been worked out in detail in small areas and the figure recorded in the clinics was almost twenty times that of the 1931 census. It varied greatly between 0.25 and 9.5 per cent. in different villages in many of which the spread could be traced as the disease is generally restricted to members of the same family and to relatives. There is a preponderance of early nerve cases in children some of which pass into the cutaneous form as they grow up.

In the other paper S. N. CHATTERJI describes the early symptoms of leprosy as seen in the Calcutta outpatient clinic, much on the usual lines. He also records some cases in which the early signs were associated with injuries which may either have attracted attention to them or possibly have aggravated the lesions.

L. R.

DEL TORO CANO (Fernando) *Nuevos casos de lepra en la zona de Protectorado de España en Marruecos. [Fresh Cases of Leprosy in Western Morocco]*—*Medicina Paises Cálidos* Madrid. 1936 Mar Vol. 9 No. 3 pp 125-128. With 2 figs.

Leprosy appears to be increasing in the western part of Morocco that under Spanish rule. Twenty were recorded in 1934 and another six in the succeeding year. A few details are given of each of these all were of the nodular type one with ulceration. Tetuán furnishes the largest number of cases. The places of residence of all are stated 8 were in Tetuán and 4 each in Jolot and Ceuta.

H. H. S.

HOWARD (A. C.) *Leprosy in Nigeria.—Internal Jl Leprosy* Manila. 1938. Jan-Mar Vol. 4 No. 1 pp 75-78. With 1 fig (map)

This brief note describes high leprosy incidence in the densely populated Southern Provinces with many advanced cutaneous cases complicated by malaria, yaws and ankylostomiasis a number of whom are dealt with in farm colonies. In the Northern Provinces among the fatalistic Mohammedans advanced cases live by begging and resent being sent to a settlement where advanced disabled cases are mainly seen but attempts are being made to attract earlier cases.

L. R.

AUSTIN (C. J.) *A Study of Leprosy in Fiji.—Internal Jl Leprosy* Manila. 1936. Jan-Mar Vol. 4 No. 1 pp 55-70 [13 refs]

Leprosy has been in existence in Fiji from a very early date.

A leprosy station was established by the Government of Fiji on the island of Beqa in 1900 and the present hospital at Makogai was opened in 1911. The number of patients has increased from 40 in 1911 to 427 in 1933.

Of the 1,365 cases recorded, 54.7 per cent. were neural in type and 45.3 per cent. were cutaneous. Investigation serves to indicate that

there is no such condition as pure cutaneous leprosy without some degree of nerve involvement.

The sex ratio of the patients was 3·2 : 1 with 76 per cent. males and 24 per cent. females. No evidence appears that sex played any part in determining the type or course of the disease in these patients.

There have been 417 deaths in the series, of which about 50 per cent. could fairly be attributed to leprosy.

Of the cases dealt with, 24 per cent. have been conditionally discharged. There were 33 readmissions, of which 9 have been re-discharged to date.

"The most satisfactory improvement occurred in the earlier sera cases and it is found that while all types can be improved the prognosis of cutaneous cases as regards cure is comparatively poor" L.R.

MASSAL (E.) La lépre dans les îles Tuamotou rattachées aux Gambier (îles Rœu et Puka Rua) (Leprosy in the Tuamoto Islands (Southern Pacific).)—*Ann. de Med. et de Pharm. Colon.* 1935 Oct-Nov-Dec. Vol. 33 No. 4 pp 1033-1038.

The author states that these small French Oceanic Islands threaten to become vast leperaria unless something is done to check the rapid increase of the disease for on Rœu 56 of the 340 inhabitants, and on Puka Rua 23 of 180 are already infected. Detailed tables of the types of the cases are given and an isolation centre in the island of Rœu is recommended for dealing with the problem. L.R.

DUNNAM (George C.) Leprosy in the Philippine Islands.—*J. Public Health* 1936. Jan. Vol. 28 No. 1 pp 27-29.

INTERNATIONAL JOURNAL OF LEPROSY Manila. 1935. Oct-Dec Vol. 3. No. 4 pp 399-442.—Report of the Philippine Leprosy Commission presented to the Governor-General September 1935.

This is an important report by a Commission appointed by the Governor to advise on leprosy policy in the Philippines, which the Governor has accepted as the basis of future action. The generally recognised facts regarding the slow infectivity of the disease are fully emphasized, and isolation with the best available treatment is advised in the case of bacteriologically positive cases, and outpatient clinic treatment for uninfected ones. Home segregation is unsuited to the local conditions, but group segregation not far from the homes of the people is preferred to further extension of the Calion Settlement, which has become too large for convenient administration with its 7,000 cases, and should gradually be reduced. The success of the local treatment centres has resulted in the majority of those isolated leaving them voluntarily. In the absence of accurate knowledge of the former incidence of leprosy it cannot be shown statistically whether the disease has decreased or not during the twenty-nine years compulsory segregation has been in force, but it is thought to be decreasing because the majority of the new cases, which have remained fairly constantly at 1,000 yearly during the last five years, are early ones. The successful regional treatment stations, which also provide for isolation of infective cases, now number seven with 1,592 patients and they include a free skin clinic at which early cases are found. They should be provided

with land for cultivation to make them partially self-supporting and the Manila city Lazar Hospital should be closed and moved to an agricultural area outside the town.

Children of lepers used to be only separated from their parents at the age of two years or more and attempts to remove them at birth to nurseries proved very fatal to them so they were only taken away from their mothers at six months of age. It is now advised that arrangements should be made to provide conditions under which they may be reared successfully when removed at birth. About one hundred children are born to lepers yearly at Culion. A subsistence allowance for lepers is advised.

It has not yet proved feasible to follow up many of the 3,500 paroled lepers but this should be done in which case release after being six months negative bacteriologically should be allowed for the confidence that has developed in the results of treatment now permits the released cases as a general rule to be well received by their families. Recent surveys indicate that relapses number nearly 50 per cent. of those discharged, so follow-up treatment is required. These various recommendations should considerably improve the present methods of controlling leprosy in the Philippines. L. R.

RODRIGUEZ (J.) MARALAY (E.) & TOLENTINO (J. G.) A Medical Survey of the Paroled Negatives Living in the Province of Cebu. A Preliminary Report.—*Monthly Bull. Bureau of Health Manila*. 1935 Nov Vol 15 No 11 pp 400-409 With 1 fig [See this Bulletin 1936 Vol 33 p 299]

GIMENO DE SANDE (A.) & FERNANDEZ VALDES (A.) Epidemia de lepra en Andújar [Leprosy in Andújar]—*Rev San e Hig Pública*. 1936 Jan Vol 11 No 1 pp 17-34 With 6 figs. [28 refs.]

Andújar is a town in the north west of the Province of Jaén in the valley of the Guadalquivir and has a population of 23,559. According to MORTANÉS there were in 1934 some 928 lepers in Spain of whom 315 were in Andújar with Badajoz and at Jaén 59. In Andújar itself 39 cases are known i.e. 1·6 per 1,000 population. Twenty-eight have been studied in detail one was under 15 years two between 15 and 20 eleven between 20 and 40 twelve between 40 and 60 and two over 60 years. Direct contact is the chief perhaps the only source in the town it was proved in two-thirds of the cases and in over half husband or wife contracted it from the other. Of 22 examined bacteriologically the nasal mucus was positive in 20 thick drop in 19 and exudation from skin lesions in 6. [These figures however convey but little information as the type of disease is not stated.] H H S

DE ALBUQUERQUE (A. F. Rodrigues) Analyse epidemiologica de 1110 fichas de leprosos da colônia Santa Izabel," Minas Geraes. [Analysis of 1110 Cases of Leprosy at the Santa Izabel Colony Minas Geraes.]—*Brasil Medico* 1935 Dec. 7 Vol 49 No 49 pp 1094-1099 [18 refs.]

This is a careful analysis from the aspects of age sex, occupation locality of origin type and stage of disease etc. Of the 1110 patients interned at the Colony males were more than twice as many as females, 2.2 to 1. More than two-fifths 41.9 per cent. acquired the infection

proves negative. It may be seen as early as in three months old children and is rare after puberty. A negative leprolin test in a child may lead to its detection. The maintenance of the general health and a few hydrocarpus injections are indicated.

L R

CHIVUTO (Sulpicio). Early Leprotic Changes in Children and their Bearing on the Transmission and Evolution of the Disease II—Monthly Bull Bureau of Health Manila, 1934 Dec. Vol. 14 No. 12 pp. 363-398 [18 refs.]

LARA & DE VERA. Clinical Observations with Reference to Leprosy in Children of Lepers.—Monthly Bull. Bureau of Health Manila 1934 Jan. Vol. 15 No. 1 pp. 17-41 [See also this Bulletin, 1934, Vol. 29 p. 543.]

RODRIGUEZ (J.) & PLANTILLA (F. C.). Observations on the Progress of Incipient Lesions of Leprosy—I. Internal. II. Leprosy Manila 1935 Oct.-Dec. Vol. 3. No. 4 pp. 453-463. With 1 fig.

The authors report further observations on repeated examinations of the earliest lesions among 338 children of lepers whom they have followed up for seven years after they had been removed from their parents at various ages. Transfer when of two years of age diminished greatly the number who became positive although NATALANG and CHIVUTO found on most of them skin lesions that they believed to be early manifestations of leprosy and regard them as frustrated cases, although many of these lesions must be considered doubtful in nature. Another group of 225 "closed" cases with definite, but bacteriologically negative dermal lesions have been studied for from seven months to four years, with an average of about two years and 31 or 13.8 per cent. have become bacteriologically positive, distributed equally between the two sexes. The red macule is most likely to become positive and a sudden change in an area of anaesthesia independent of macules was also of ominous import. Positive cases were significantly less among those regularly than in those irregularly treated, although in some even prolonged treatment did not prevent them becoming positive.

L R

PLANTILLA (Fidel C.). Observations on Leprosy at the Caloocan Dispensary—Monthly Bull. Bureau of Health Manila 1935 Jan. Vol. 15 No. 1 pp. 3-18.

Work at out patient skin clinics has led to the discovery of many early cases of leprosy although many still come late. Relapses among paroled cases have also been discovered. Recently examination of 577 house and other contacts revealed 21.3 per cent. with suspicious and 3.2 per cent. with definite, lepromatous lesions all the latter showed anaesthesia or lepra bacilli. In women the figure was 3.7 against 26.2 men none of the latter being over 25 years of age. The suspicious lesions are very difficult to differentiate from common skin lesions, but it is hoped by following them up to be able to establish which are leprotic and which are not. In 1932 the examination of school children in badly infected areas revealed among 13,536 2.6 per mille of infections but this is a very low figure compared with 3.2 per cent. among contacts. The most common lesions are pale pinkish areas and infiltrations.

L R

PARDO-CASTELLO (V) Leprosy associated with Dermatitis Atrophicans Diffusa et Progressiva.—*Arch Dermat & Syph* 1936 Jan. Vol. 33 No 1 pp 12-20 With 6 figs

SCHUJMAN (Salomon) Coexistencia de absceso nervioso y lepra tuberculosa (algunas consideraciones sobre la patogenia destes dos procesos) [Nerve Abscess and Tuberculoid Leprosy]—*Rev Leprologia de São Paulo* 1935 Dec. Vol. 2. No 4 pp 277-289 With 6 figs. [11 refs.] English summary (8 lines)

Three cases are described in which an abscess appeared in the course of a thickened nerve in two on the arm, in the third on the chin and neck and on the left gluteal region. In each case purulent broken down material was obtained on incision containing in one case (the third) a few bacilli, in the others none. The author concludes —

The neural leprous abscess is the tuberculoid leprosy of the nerve or still better the tuberculoid granuloma of the nerve in open reaction similar to the reactions observed in the tuberculoid lesions of the skin. Both the leprous abscess and the lepra reaction of tuberculoid leprosy are to be regarded as allergic phenomena (tanto el absceso leproso como la reacción leprosa tuberculoide podrían interpretarse como fenómenos alérgicos) H H S

EMER (P H) Psychoses bij lepra. [Psychoses in Leprosy]—*Genescht Tijdschr v Nederl Indië* 1936 Feb 25 Vol. 78 No 8 pp 463-480 [39 refs]

This paper is almost identical with that already abstracted. [Ante p 300] H H S

TOLENTINO (Jose G) Leprosy of the Palms and Soles—*Monthly Bull Bureau of Health Manila* 1934 Sept. Vol. 14 No 9 pp 281-287

COWDRY (E V) HEIMBURGER (L F) & WILLIAMS (P S) A Spectrographic Study of Lepromatous Lesions.—*Amer Jl Path* 1936 Jan. Vol. 12. No 1 pp 13-29 With 2 plates & 1 graph. [12 refs]

This is a highly technical paper from which it is concluded that the ratios of P to Ca in five lepromatous lesions was on the average probably three times those in normal skins but the Na-Ca, Mg-Ca and Fe-Ca ratios showed no notable variations from the normal. L R

LIE (H P) Demonstration of the Leprosy Bacillus in the Lepriidae.—*Internat Jl Leprosy Manila* 1935 Oct.-Dec. Vol. 3 No 4 pp 473-478

The author refers to the difficulty in demonstrating lepra bacilli in the ordinary spots of macular leprosy but has found that with proper technique and sufficient patience he has always been able to demonstrate them and he thinks that scarcely anyone can doubt that these lesions are due to the presence of the bacilli as long as the process is an active one.

He has now extended his observations to histological examinations of series of sections of the lesions of ten tuberculoid cases sent to him from South Africa and succeeded in demonstrating a few scattered and often isolated lepra bacilli by the technique he describes in detail, and which should be referred to by all interested L. R

POONAN (A.) Eine einfache Methode zur Färbung von Leprosy- und Tuberkelbacillen.—Arch f. Schiffs u. Trop-Hyg. 1936 Dec. Vol. 40 No 3 pp 112-114 With 1 fig.

LEFÈVRE (G.) La valeur de l'examen du mucus nasal et des biopsies cutanées comme procédés de diagnostic bactérioscopique de la lépre. [Examination of Mucus and Sections for Leprosy Bacilli].—Bull. Soc. Path. Exot. 1935 Dec. 11 Vol. 28. 2e. M. pp. 899-903

The author reports his experience of the relative value of the examination of nasal mucus and of sections of leprous tissues respectively in the diagnosis of leprosy. The results are clearly shown in the different forms and stages of the disease in Table I. This brings out the adequacy of nasal infection in the early macular form of leprosy and in nerve cases. Moreover in the first year of the disease the nasal mucus was only positive in 3.6 per cent. but sections of the tissues revealed the bacillus in 30 per cent of the cases and after the first year the nasal mucus was positive in 25 per cent. and sections in an additional 13 per cent. or a total of 40 per cent. He has not found the administration of potassium iodide to increase the number of positive results from the nasal mucus.

Result of the Examinations following the Form of the Disease

Number of Cases	Clinical Form	Nasal Mucus +	Biopsy +	Total +	Nasal Mucus Percentage +	Biopsy Percentage +	Total Percentage -
130	Macular	2	22	24	1.6	16.9	13.2
35	Papulo	11	19	30	31.4	54.2	35.7
21	Tubercular	19	2	21	90.4	9.5	100.0
24	Nervous	3	1	4	12.5	4.1	16.6
210		35	44	79	16.6	20.9	37.4

L.R.

PIETER. Une nouvelle méthode de démonstration du bacille d'Hansen dans quelques lésions non ouvertes de la peau. [New Method of demonstrating Hansen's Bacillus].—Rec. Med. et Hyg. Trop. 1935 Sept-Oct. Vol. 27 No 5 pp. 233-234.

The skin over a lesion should be cleaned with ether and acetone, scarified as for von Pirquet's reaction, a small cup applied and the drop of serum thus obtained on a slide stained with eosine and methyl blue each 10 cgm. by Wright's method.

L.R.

LEFÈVRE (G.) & DES ESSARTS (J. Quadrangal) Biopsies cutanées et histo-diagnostic de la lépre. [Diagnosis of Leprosy by Biopsy Examination of the Skin].—Bull. Soc. Path. Exot. 1936 Feb. 12 Vol. 29. No 2 pp. 186-183.

The authors have shown by examinations of the nasal mucus and of small portions of the affected skin that leprosy bacilli can be found in 40 per cent. of cases, and they have inquired if this number can be increased by histological examinations. They report that in 175 cases

simple smears showed the bacilli 44 times but by close examination of histological sections they found very scanty bacilli in 6 additional cases. They also discuss the tissue changes met with, and find that they are similar to those produced by other granulomatous diseases such as tuberculosis, syphilis, lymphogranuloma and certain mycoses.

L R

FERNANDEZ (Jose M M) *Bacteriología de la reacción leprosa. Investigación del Mycobacterium leprae en las lesiones cutáneas de reacción leprosa.* [Study of *Mycobacterium leprae* in the Cutaneous Lesions of the Leprosy Reaction.]—*Rev Brasileira Leprologia* S Paulo 1936 Mar Vol. 4 No 1 pp 9-26 With 3 figs. English summary

The author examined 24 cases of leprosy reaction making a small incision with a scarifier and scraping the edge to obtain serum spreading the product on a slide fixing and staining in the usual way. This was done on pre-existing nodules or maculae on parts apparently healthy at the time of the reaction and during its regression and in areas round the reacting foci.

In the actual cutaneous lesions of the reaction at the time and during retrogression the bacilli were seen in the granular form sometimes but not always with the bacillary form the granular predominated according to the intensity of the local reaction. The acute period is marked by the degree of polymorphism of the bacilli and by aggregation of them. The skin adjacent to the reacting lesions was always positive, showing the granular forms whereas apparently normal skin at a distance was nearly always negative. Nodules, macules and infiltrations though not appearing to join in the reaction often showed abundant granular forms especially if the reaction was severe. In lepromata at a distance from the site of reaction the organisms were in the usual form of globi of entire bacilli.

H H S

MANALANG (C.) *Pathologic and Bacteriologic Survey of Lepers (Post Mortem)* II—*Monthly Bull Bureau of Health Manila* 1934 Nov Vol 14 No 11 pp 335-340 [11 refs]

MANALANG (C.) *Pathologic and Bacteriologic Survey of Lepers (Post Mortem)* IV—*Monthly Bull Bureau of Health Manila* 1935 Oct. Vol. 15 No 10 pp 361-364

Post mortem histological examinations have been made of areas of apparently normal plantar surfaces of the feet of 16 Culion lepers and histological abnormalities found in 94 per cent. and the *M. leprae* in 87.5 per cent. The author therefore thinks that drug infiltration should include the plantar and palmar surfaces, and multiple smears of these areas should be made before parole and that the infection of the nerves in leprosy is probably always from the periphery.

L R

MANALANG (C.) *Pathologic and Bacteriologic Survey of Lepers (Post Mortem)* V—*Monthly Bull Bureau of Health Manila* 1935 Nov Vol 15 No 11 pp 391-399 [14 refs]

In this note the author reports on post mortem microscopical examinations of the apparently healthy skin of some of the areas believed to be relatively immune to leprous lesions including the clinically normal (10-4)

posterior inferior auricular and inguinal regions. In 40 cases examined 16 or 40 per cent. of the auricular regions showed lepra bacilli, which he thinks are derived from the neighbouring lobes of the ear, for the organisms were only found in 4 per cent. in the inguinal region situated further from active lesions. L. R.

BRECHILLI (Luiz Marino) Considerações sobre alguns casos de esplenomegalia na lepra. [Splenomegaly in Leprosy].—Rev. Letras de São Paulo 1935 Dec. Vol. 2 No. 4 pp. 213-225 With 16 text figs. & 3 coloured figs. on 1 plate. [62 refs.] English summary.

This article is in three parts—the first gives details of the physical condition and the results of laboratory investigation of 11 cases of leprosy—the second treats of the pathological anatomy of the spleen in leprosy. Eight of the 11 gave a positive Wassermann reaction (1-4 plus) one gave a 4 plus Kahn but negative W.R., in two the serum test is not mentioned. The illustrations in the pathological part of the paper are excellent. The third part considers the differential diagnosis of the causes of splenic enlargement as presented in his cases. He notes that splenomegaly occurred only in nodular and mixed forms that it was rarely accompanied by pain and concludes that although examination of material obtained by spleen puncture did not reveal lepra bacilli, nevertheless leprosy itself can cause this enlargement. H. H. S.

CAMPOS (Nelson da Souza) Tuméfaction cérébrale des nerfs au cours de la lépre. Étude des névrites nodulaires caractéristiques de structure tuberculoïde. [Cerebral Swelling of Nerves].—Internat. Jl. Leprosy Manila 1936 Jan.-Mar. Vol. 4 No. 1 pp. 1-21 With 26 figs on 6 plates. [11 refs.]

The author gives a detailed illustrated description of fifteen cases of nodular thickening of the nerves with caseation, and regards the condition as a mild tuberculoid form of the disease with a high degree of immunity. L. R.

TAKINO (Masudchi) & MIYAKE (Sboxo) Die Veränderung der vegetativen Nerven bei der Lepra, besonders bei der infiltrativen Form. [Nerve Changes in Leprosy].—Acta Scholae Med. Univ. Imperiale in Kyoto 1935 Vol. 18. No. 2. pp. 85-115 With 5 figs & 4 plates (1 coloured) [21 refs.]

This is a well illustrated account of the histology of lepromatous leprosy with descriptions of the formation of globi containing numerous bacilli and the distribution of the organisms in the nerves. L. R.

MUIR (Ernest) Cellular Reaction to *Bacillus leprae*.—Trans. Roy Soc. Trop. Med. & Hyg. 1936 Feb. 29 Vol. 29 No. 5 pp. 547-552. With 8 figs. on 4 plates.

The author summarizes his views on this question with histological illustrations. The symptoms of leprosy are caused by local cellular reactions to the bacillus of very varying types in response to the multiplication of the organisms in the intercellular lymph spaces and cells of the skin and nerves. If the response is weak cell division is

sluggish and ingestion feeble with the result that the bacilli become very numerous in vacuolated cells. If the response is strong the lymphoid and endothelial cells multiply greatly and even giant cells form, but very few bacilli are present as in the tuberculoid type of lesion and abscesses may form in the nerve trunks. In young children the response is weak with little cellular reaction and positive leprolin reactions. The bacilli may accumulate in the nerves which may be a reason for the difficulty in completely destroying the organisms

L R

OLASCO (J O) Calcification and Osteoid Changes in the Nerve in Leprosy Report of a Case—*Internal Jl Leprosy* Manila, 1936 Jan.-Mar Vol. 4 No 1 pp 25-28 With 3 figs. on 1 plate

TAJIRI (Isamu) Leprotic Changes in the Lung—*Internal Jl Leprosy* Manila, 1935 Oct.-Dec. Vol. 3 No 4 pp 467-470 With 4 figs. on 1 plate.

The author reports on the microscopical examination of the lungs post-mortem in five cases in which tuberculous infection could be excluded. He found no naked eye lesions but in sections small lepromata were detected in the alveolar septa due to the bacilli of nodular cases reaching the organ through the blood stream. In the macular and neural cases leprotic changes never occur in the lung except in nerves

L R

LAGOUDAKIS (Socrates) Preliminary Note on Self-Inoculation of Leprosy—*Jl Trop Med & Hyg* 1936 Apr 1 Vol 39 No 7 pp 81-83

This is a remarkable account of the intravenous inoculation of the author on three occasions with 3 gr [sic ? cc.] of blood from a Greek leper twice and a native leper once. A month later he began to get pain in one foot ten days later two small subcutaneous lepromas appeared on his hands and other lesions during the following month including anaesthetic spots. He states that lepromas are forerunners of the disease in which microbes are found, and writes of the ultravirus. He does not clearly say whether bacilli were found in his lesions but mentions that they cleared up under intradermal treatment begun five months after the first inoculation on June 9th 1934. His colleagues apparently agreed with the diagnosis of early leprosy

L R

SHIGA (K) Studies concerning the Leprabacillus. 2nd Communication Intracerebral Infection with Leprabacilli.—*Kitasato Arch Experim Med* 1936 Jan. Vol. 13 No 1 pp 1-8. With 3 coloured figs on 1 plate.

The author reports on his numerous animal experiments. He first refers to his previous paper of 1929 [thus *Bulletin* 1930 Vol. 27 p 339] on the culture of the lepra bacillus and states that he never succeeded in getting beyond the microscopic colonies he had then obtained. He then refers to five years work at the inoculation of animals with the organism for which he found mice the most suitable and mentions that the bacilli lived longer in those fed on diets deficient in vitamins but removal of certain organs or the use of various drugs and chemicals

posterior inferior auricular and inguinal regions. In 40 cases examined 16 or 40 per cent. of the auricular regions showed leprosy bacilli, which he thinks are derived from the neighbouring lobes of the ear, for the organisms were only found in 4 per cent. in the inguinal region situated further from active lesions.

L.R.

BECHELLI (Luiz Mariano) Considerações sobre alguns casos de esplenomegalia na lepra. [Splenomegaly in Leprosy]—Rev. Leprosaria de São Paulo 1935 Dec. Vol. 2. No. 4 pp. 213-223. With 16 text figs. & 3 coloured figs. on 1 plate. [32 refs.] English summary.

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H.B.S.

CAMPOS (Nelson de Souza) Tuméfaction cutanée des nerfs au cours de la lèpre. Étude des névrites nodulaires caractéristiques de structure tuberculoïde. [Caceous Swelling of Nerves]—Internat. Jl. Leprosy Manila 1936. Jan.-Mar. Vol. 4 No. 1 pp. 1-4. With 26 figs. on 6 plates. [11 refs.]

The author gives a detailed illustrated description of fifteen cases of nodular thickening of the nerves with caseation, and regards the condition as a mild tuberculous form of the disease with a high degree of immunity.

L.R.

TAKIKO (Masukchi) & MIYAKE (Shozo) Die Veränderung der vegetativen Nerven bei der Lepra, besonders bei der infiltrativen Form. [Nerve Changes in Leprosy]—Acta Scholae Med. Univ. Iwafuda in Kyoto 1935 Vol. 18. No. 2. pp. 85-115. With 5 figs. & 4 plates (1 coloured) [21 refs.]

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The author summarises his views on this question with histological illustrations. The symptoms of leprosy are caused by local cellular reactions to the bacillus of very varying types in response to the multiplication of the organisms in the intercellular lymph spaces and cells of the skin and nerves. If the response is weak cell division

conclude that the tuberculosis test gave 70 per cent. of positive reactions in nodular and 30 per cent. in nerve leprosy and the syphilitic test gave 44 per cent. positive in nodular and 30 per cent. in nerve cases of leprosy

L. R

VILLELA (Gilberto G.) & CASTRO (Almir) Estudos sobre a bioquímica da lepra. I Cholesterol e esteres de colesterol no plasma.—*Brasil Medico* 1938 Jan 4 Vol 50 No 1 pp 1-2. With 2 charts

JORDAN (Paul) Uebertragung der Lepra des Menschen auf Zuchtratten mit der Möglichkeit zum Weiterimpfen und auch als fortschreitende Krankheit. [Inoculation of Rats with Human Leprosy]—*Arch f Schiffs u Trop Hyg* 1938 Mar Vol 40 No 3 pp 92-112. With 9 figs [29 refs.]

The author deals with the question of the possibility of inoculating bred rats with human leprosy. He concludes that the numerous attempts to do so have twice resulted in producing tumours in the skin of the animals by this means with an incubation period of 1½ to 1½ years. A second passage led to the evolution of the disease to affect the internal organs.

L. R

MOCHTAR (A.) & SARDJITO (M.) Gejodeerde chaulmoogra aethylicus in de therapie der lepra [Iodized Chaulmoogra Ethylate in the Treatment of Leprosy]—*Genesk Tijdschr v Nederl Indië* 1938 Apr 21 Vol 76 No 16 pp 973-883 With 8 figs. on 2 plates. [10 refs.]

The iodized ethylate of chaulmoogra is the ethyl ester with addition of 0.5 per cent. iodine. It has been used in the treatment of leprosy since about 1920. The addition of the iodine has served to limit the local irritation effect of intramuscular injection and also some of the general symptoms such as giddiness, fever, headaches and rheumatic pains. Iodine moreover is disinfectant and may itself contribute something in the treatment of leprosy. Comparative trials were instituted between the efficacy of alepol chaulmoogra oil and the ethyl ester in which the last of these appeared to be the most efficacious but the numbers under test were very small. Of 43 patients treated with iodized ethylate in 1934 at the polyclinic 23 showed improvement, 17 remained stationary and 4 were worse. Not only is this medicament usable in polyclinic and hospital but is because of the smallness of the dosage and the slight reaction specially suitable for large-scale country district operations. Such operations also have the great advantage of being less costly than institutional treatment. These seem to be arguments which justify extended trial of the ethylate of chaulmoogra in leprosy

W F Harvey

ROY (A. T.) & RAO (G. R.) Fluorescein in Lepra Reaction.—*Indian Med Gaz* 1936 Jan Vol 71 No 1 pp 25-28. With 4 charts.

The authors having previously reported beneficial effects in prolonged lepra reactions from the use of mercurochrome-220 soluble a fluorescein compound of mercury they have tested the value of fluorescein itself in view of its recommendation by RYRIE at the Purulia Leper Colony with 800 inmates and 2,000 outpatient attendances monthly. As the term lepra reaction has been applied to anything from periodic pains through brief febrile self-clearing reactions to severe

prolonged ones, they have confined their tests to prolonged seven febrile rises of over seven days duration, with the exacerbation of old and the appearance of new lesions and all the twelve cases dealt with were under close observation in hospital. Nine were treated with fluorescein in doses of 10 cc. of a two per cent. freshly prepared solution of Grubler's water-soluble preparation two to three times a week, and records were kept of the erythrocyte sedimentation index and the temperature. Three control cases were treated respectively with potassium antimony tartrate physiological saline and no special treatment. They conclude that although two to four injections of fluorescein have an undoubted antipyretic effect, no beneficial effect was obtained on the sedimentation index or in decreasing the debility and similar falls of temperature occurred in the controls. The drug may be of some value as an alternative to the antimony preparation.

L.R.

DOROLLE (P.) NGO-QUANG-LY HUYNH VAN HUY & TRAU-TA-LU
Bleu de méthylène et bleu de méthylène-tosine dans le traitement de la lépre. Étude de la toxicité expérimentale et résultats cliniques obtenus. [Methylene Blue Alone and with Eosine in the Treatment of Leprosy]—*Bull. Soc. Path. Exot.* 1935. Vol. 28. No. 9. pp. 839-849 [10 refs.]

This paper brings up the number of cases previously reported (*ante p. 309*) from 30 to 55 and comes to the same conclusions regarding the value of the treatment especially when combined with chaulmoogra preparations.

L.R.

SOUZA ARAUJO (H. C.) Treatment of Leprosy by Methylene Blue—*Internat. J. Leprosy*. Manila. 1935. Oct.-Dec. Vol. 3. No. 4 pp. 471-473 [11 refs.]

The author points out that the methylene blue treatment of leprosy was first used by Miguel Coelho and Mario RAXEL in 1827 in Rio de Janeiro long before MONTEL, and they obtained the tattooing of the lesions, but only slight temporary improvement, and concluded from study of ten cases that absolutely no therapeutical result was obtained.

L.R.

- i. MONTEL (R.) & LE VAX PHUNG Un cas de lépre tuberculeuse généralisée Blanchu cliniquement et bactériologiquement en 11 mois. Traitement mixte par le bleu de méthylène et le chaulmoogra. [Methylene Blue and Chaulmoogra in Leprosy]—*Bull. Soc. Path. Exot.* 1935. Jan. 8. Vol. 29. No. 1. pp. 23-25
- ii. LÉFÈVRE (P.) & MARKIANOS (J.) Résultats obtenus dans le traitement de la lépre par le bleu de méthylène. [The Treatment of Leprosy by Methylene Blue]—*Ibid.* pp. 29-30
- iii. BERON (P.) Action du bleu de méthylène administré par voie buccale sur les douleurs des lépreux. [Methylene Blue by Mouth in the Treatment of the Pains of Leprosy]—*Ibid.* pp. 30-31 [14 refs.]

i. This is an account of a single nodular case of leprosy of three years duration, whose symptoms cleared up with the exception of some remaining nerve thickening and loss of sensation, after 10 months' treatment, including 72 injections of methylene blue, 5 of carbon

porphyrise of St Jaques 52 of collobiase de chaulmoogra and 13 of Merchado's chaulmoogra mixture.

ii. These workers report a trial of the methylene blue treatment uncomplicated by the use of other drugs continued up to 14 months in some cases following rigorously Montel's method. The first results were encouraging with softening and reduction of nodules by ulceration and decline of the temperature in febrile cases. Unfortunately the benefit was very limited as the general course of the disease was not influenced and some of the patients after a time declined to continue the treatment. They then tried it in early cases with limited cutaneous lesions but no improvement resulted. In nerve forms and mixed ones no appreciable benefit resulted from prolonged trials. They confirm the tendency of the lepra bacilli to lose their acid fast characters under the treatment. Although they have obtained no certain improvement in the general condition of their patients or any profound modification in the course of the disease they are continuing their trials of the drug.

iii. A trial of methylene blue orally in pill form up to 30 cgm. daily resulted in a rapid reduction in the pains of leprosy patients with relief of considerable duration.

L R

VALLE (Sergio) Prophylaxia da cegueira na lepra. [Prevention of Blindness in Leprosy]—*Brasil-Médico* 1936 Mar 28. Vol 50 No 13 pp 265-275 With 3 figs.

The insidious march of leprosy its chronicity in evolution may lead to blindness in spite of every care and precaution. If the posterior segment of the eye is not involved there may be perception of light for a long time in fact until the globe atrophies or swells to a staphyloma. According to the author infection enters anteriorly by way of the anterior ciliary arteries through anastomoses with the posterior vessels of the conjunctiva extending thither from the supraciliary or palpebral region or neighbouring site. Thus is explained the predilection for the anterior segment and early localization between the recti tendons and the cornea. For prophylactic purposes the author employs perikubic cautery peritoneal removal of tubercles followed by cautery of the surface. For active lesions he is in favour of copper salts. In acute crises with severe and persisting pain he finds trypan blue given by the method of Muir and Chatterji, quite satisfactory. He recommends dark glasses to avoid the dazzle in cases of rupture of the iris to reduce photophobia and protect the insensitive cornea from dust and wind.

H H S

NOCHT (B.) Fieberbehandlung bei Lepra.—*Arch f Schiffs u Trop Hyg* 1936 Jan. Vol 40 No 1 pp 2-5 With 4 figs [See this Bulletin 1936 Vol. 33 p 315]

PAUL (Milroy) Surgical Measures in Leprosy—*Internal Jl Leprosy* Manila. 1936 Jan.-Mar Vol. 4 No 1 pp 29-34 With 1 fig

At the Hendala Leper Asylum of Ceylon the author found superficial ulcers of the foot in 347 or 52 per cent. of 658 inmates and perforating ulcer of the foot in 27 patients. In the former he obtained regular success by applying adhesive plaster directly to the ulcers after cleaning with warm water and covering with dressings to absorb the purulent discharge and changing the latter only when they became

soaked, so as to leave the epithelium to grow over the surface undisturbed. No chronic ulcer failed to improve and all healed with perseverance with the method. For perforating ulcers he agrees that sequestered fragments or the whole carious metatarsal bone should be removed, preferably through a dorsal incision. Amputations should be avoided as far as possible as the patients can rarely wear an artificial limb. For burns of the fingers the tannic acid treatment is not suitable, and he advises the use of bakelite cups, etc. which do not conduct heat well and are not easily broken in place of metal ones in order to avoid burns of the anaesthetic fingers. L.R.

BROWN (James A. K.) Some Dietetic Factors in Leprosy with Special Reference to B-Avitaminosis.—*West African Med. J.* 1935 Nov Vol 8, No 4 pp 1-7 [39 refs.]

The author quotes from various authorities statements regarding the importance of diet in leprosy and goes on to advocate the administration of vitamins. Working in the Uruakoh Leper Colony *ibid.* he found the diet adequate in 57.5 marginal in 20 and inadequate in 22.5 per cent. of his cases. He tested the value of giving vitamin B in the form of marmite and an extract of rice polishings prepared by Mearns, Ferris of Bristol but states that "the results did not show any definite improvement, although 43.4 per cent. did show gain in weight. It is hoped to test further the use of vitamins A and E." L.R.

REENSTIERNA (John) Therapeutic Trials with an Anti-Leprosy Serum (In Sweden and Ethiopia).—*Acta Med. Scandinavica.* 1935 Vol 88, No 2-4 pp 390-408

The author states that his serum is made by injecting sheep repeatedly with acid-fast bacilli and their toxins, including Kedrovsky's and Palkrook's cultures and a very similar one the author cultured from a case of leprosy. A detailed description of its preparation will be published later. The serum has been used in 4 cases at the Jarvao Leprosarium and in over 30 cases at Addis Ababa in Ethiopia and it is claimed that in all patients except those who were moribund the ulcers healed, nodules subsided and in 63 per cent. of the cases sensibility returned in fingers and toes. The author says that only a very inconsiderable beginning has yet been made with the trial of his serum. Further reports will be awaited with interest. L.R.

FISCHL (Viktor) Zur Chemotherapie der Tuberkulose und Leprosie [Chemotherapy of Tuberculosis and Leprosy].—*Zschr. f. Immunologie u. Experiment. Therap.* 1935 May 29 Vol 85, No 1-2 pp 71-76

The author gives a table of chaulmoogra and other oils used in the treatment of tuberculosis and leprosy, and he concludes from experiments on mice infected with avian tubercle that no surely efficacious preparation has yet been obtained. L.R.

GOLOVINS (S.) Contribution à l'étude du traitement de la lépre.—*Bol. Soc. Path. Exot.* 1935 Nov 13 Vol 28 No 9 pp 747-759

HOFFMANN (W. H.) Las modernas orientaciones sobre la lepra.—Reprinted from *Rev. Med. y Cirug. Habana.* 1935 Vol 40 No 1 pp 310-323

YELLOW FEVER.

SAWYER (Wilbur A.) *The Present Geographic Distribution of Yellow Fever and its Significance*.—Reprinted from the *Harvey Lectures 1934-1935* pp 68-92. With 5 maps. [32 refs.]

An interesting general account of the subject with special reference to yellow fever immunity observations and the new light they throw on the epidemiology and general distribution of the disease. In yellow fever as in many other infectious diseases it is becoming evident that missed cases comprise the majority of the infections and the author mentions that if suitable laboratory tests had been available the leaders in yellow fever thought and work in the past would not have concluded that the disease depended for its persistence on endemic foci in a limited number of key cities. *E Hindle*

FINDLAY (G M) & DAVEY (T H.) *Yellow Fever in the Gambia. I. Historical*.—*Trans Roy Soc Trop Med & Hyg* 1936 Apr 8 Vol. 29 No 6 pp 667-678 With 1 chart. [27 refs]

An interesting compilation of the history of outbreaks of epidemic disease in the Gambia from its discovery in 1455. These periodic outbreaks have been attended by a high mortality and occurred before and after the introduction of cinchona bark as a routine treatment of fever. However proof that the earlier epidemics were due to yellow fever is lacking but in view of the problem as to whether the disease is of African or American origin it is worthy of note that there has been no change in the general character of these epidemics either before or after the discovery of America either before or after the institution of the slave trade and either before or after the general introduction of cinchona bark as a routine treatment for tropical fevers.

Since the foundation of Bathurst in 1816 outbreaks of yellow fever have occurred periodically in the town but have not been recorded in the Gambia Protectorate. There is a faint suggestion that the Bathurst epidemics occur at intervals of either from 5 to 6 or from 11 to 12 years and a chart is given showing their correlation with variations in the sun-spot cycle. Eight out of 11 sun-spot minima between 1825 and 1935 have been associated with outbreaks of yellow fever in the Gambia. Three others occurred at or near the sun-spot maxima and the fourth outbreak in 1862 was probably merely a continuation of the 1859-60 epidemic. *E H*

DURAND (R.) & BONNEAU (E) *Enquête faite dans un bataillon de tirailleurs sénégalais en vue de déceler par les épreuves sérologiques les atteintes antérieures de fièvre jaune*. [An Inquiry made among a Battalion of Senegalese in order to determine, by Serological Tests, Previous Infections with Yellow Fever]—*Bull Soc Path Exot* 1936 Feb 12. Vol. 29 No 2 pp 100-101

The authors have examined the sera of 31 soldiers from a Senegalese battalion originally from West Africa but now completing their service in Tunisia. All the subjects were aged from 20 to 35 years and their blood was tested by means of the mouse protection test.

The results are given in the following table, which shows that more than 30 per cent. were positive and supports the view as to the frequency of this infection among the African natives.

Colonies	Number of subjects examined	Positive	Negative
Dahomey	3	1	
French Sudan	7	4	3
French Guinea	9	5	4
Ivory Coast	8	0	8
Upper Volta	4	1	3
Total	31	11	20

E. H.

PARIS OFFICE INTERNATIONAL D'HYGIENE PUBLIQUE. Session of Mr. 1938 Report of the Yellow Fever Commission. [Monographed translation.]

SOMER (F. L.) Recent Extensions of Knowledge of Yellow Fever [Annex I to Report of Committee on Yellow Fever Pan-African Health Conference Johannesburg Nov 20-30 1935]—Quarterly Bull. Health Organisation League of Nations Geneva Mar Vol 5 No 1 pp 19-43. With 4 graphs 1 map & 1 fig. [36 refs.]

SELWYK-CLARKE (P. S.) Yellow Fever in West Africa. [Annex II to Report of Committee on Yellow Fever Pan African Health Conference Johannesburg Nov 20-30 1935]—Quarterly Bull. Health Organisation League of Nations Geneva 1936 Mar Vol 5 No 1 pp 69-78.

A general review of the subject with special reference to the epidemiology of the disease and preventive measures in West Africa.

E. H.

LLOYD (Bolivar J.) Public Health Significance of our Newer Knowledge of Yellow Fever.—Southern Med. Jl. 1936 May Vol 29 No 5 pp 533-538

A general account with special reference to the methods of dealing with certain reported cases of yellow fever in the past.

E. H.

HICKS (E. P.) & CHAND (Subedar Diwan) Transport and Control of *Aedes aegypti* in Aeroplanes.—Records of the Malaria Survey of India. 1936. Mar Vol. 6. No 1 pp 73-80. With 2 figs. & 1 map. [24 refs.]

Female *Aedes aegypti* in cages were placed in the baggage compartment of aeroplanes at Karachi and travelled alive to Amsterdam and over a considerable part of the return journey although they had no opportunity of feeding en route and also a pyrethrum spray is used as a routine in the cabin. It would seem, therefore, that this mosquito suffers no ill-effects when exposed to reduced atmospheric pressure.

Experiments showed that *Aedes aegypti* in aeroplanes are destroyed by a spray of Pyrocide 20 in amounts equivalent to 3 cc. per 1 000 cubic feet with an exposure of 5 minutes for cabins and baggage rooms and 15 minutes for less accessible spaces. Before use this dose is diluted 1:20 with kerosene. The results of some experiments suggested that the killing effect of the mixture varied with the dose of pyrocide and that the degree of dilution was of minor importance but changes in humidity produced different effects.

The authors examined 106 air liners arriving at Karachi but no mosquitoes were found. After discussing the known distribution of yellow fever in Africa it is concluded that at present there is little danger of the import of infected *Aedes aegypti* from the Sudan to India but the danger from Nigeria is rather greater. E H

SPRANGER (H) Das Internationale Sanitätsabkommen für die Luftfahrt und seine Bedeutung vor allem für die Verhütung des Gelbfiebers im internationalen Luftverkehr [The Health Agreement for International Air Traffic particularly with regard to the Prevention of Yellow Fever]—Deut Med Woch 1936 Mar 27 Vol 62 No 13 pp 514-518 With 1 map [Summary appears also in Bulletin of Hygiene]

Owing to the spread of air travel there is a danger that persons who are already infected may travel during the incubation period thousands of miles from where the infection occurred and even as in the case of smallpox spend several days in the country of arrival before the disease develops. In the case of yellow fever with an incubation period up to 13 days [though it is usually only 4 or 5 days] the infection may be carried from the infected parts of Africa to India.

By an international agreement made in 1934 it is provided that officials at air ports can refuse to allow persons to travel who in the opinion of the medical officer attached to the airport show any signs of infectious disease and may require suspicious cases to undergo a period of observation. Intending passengers who have not had smallpox are required to show that they have been vaccinated not longer than three years or less than twelve days before. At each international airport a doctor must always be available and a room provided for medical examination. Provision must also be made for the isolation of cases at the airport or its vicinity and arrangements must be made for sending specimens to a laboratory and for necessary disinfection measures. Special precautions against yellow fever are taken in Germany on the arrival of Zeppelins from Brazil, although it is considered very unlikely that that disease could spread in Europe. In Africa however there is a danger of the infection being carried from one part of that continent to another and attention is called to the value of the mouse test to determine immunity. This test is in use in British Gambia the Gold Coast Nigeria French West Africa Brazil, the Belgian Congo and the Sudan.

The disinfection of aeroplanes against mosquitoes is carried out by spraying a mixture of 1 part of a 2 per cent. solution of pyrethrum in paraffin with 4 parts of a 2 per cent. solution of pyrethrum in carbon tetrachloride. Mosquitoes are killed in 5 minutes when the mixture is used in quantities of 5 cc. for each 1 000 cubic feet. Similar results

are obtained with the same mixture but with no pyrethrum dissolved in the carbontetrachloride. [See also *Bull. of Hyg.*, Vol. 11, p. 277.]

A. J. Collier

SIMES (C. B.) Insects in Aeroplanes. [Annex III to Report of Committee on Yellow Fever Pan-African Health Conference, Johannesburg, Nov. 20-31 1935]—*Quarterly Bull. Health Organisation League of Nations*, Geneva, 1936, Mar., Vol. 5, No. 1, pp. 70-86 [See this *Bulletin* 1936, Vol. 33, p. 343.]

SPRATTON (C. A.) The Position of India in Regard to the Yellow Fever Question. [Annex IV to Report of Committee on Yellow Fever Pan-African Health Conference Johannesburg Nov. 20-31 1935]—*Quarterly Bull. Health Organisation League of Nations*, Geneva, 1936, Mar., Vol. 5, No. 1, pp. 87-88.

In view of the danger to India of the introduction of yellow fever, the author recommends a thorough examination by mouse protein and viscerotome tests of the neighbourhood of all aeroplane stops places in the Anglo-Egyptian Sudan, Kenya and Uganda, and blood tests to determine the limits of its endemicity. Moreover the crews of all planes crossing from Africa to India should be vaccinated against yellow fever.

E. B.

BAIN (F. D.) A Practical Way of dealing with *Aedes aegypti* (*Aedes fuscipes*) Mosquito Breeding in Country Craft.—*Indian Nat. Ge.*, 1936, Feb., Vol. 71, No. 2, pp. 79-80.

The author calls attention to the prevalence of *Aedes aegypti* in small craft particularly sailing ships of several types, which enter Bombay. In less than 2 months he examined 898 of these ships and found the yellow fever mosquito breeding in 458.

At present it is only possible to empty out the drinking water containers if the master agrees. Statutory powers are required to enforce mosquito proofing etc.

P. A. Barker

SELLARDS (Andrew Watson) & LAIGRET (Jean) Nouvelle démonstration de l'efficacité de la vaccination contre la fièvre jaune. A New Demonstration of the Efficacy of Vaccination against Yellow Fever]—*C. R. Acad. Sci.* 1936, Apr. 27, Vol. 22, No. 17, pp. 1467-1468.

The authors state that 12,000 persons in French West Africa have been vaccinated by the use of attenuated mouse virus, without a single case of yellow fever having occurred amongst them, although cases have occurred amongst non-vaccinated persons.

A volunteer received a single injection of 15 mouse units in a suspension of brain after 256 passages in mice. Living virus was detected in his blood circulation, but the patient showed no obvious clinical reactions. Seven months later this subject was bitten by 4 infected mosquitoes, *Aedes aegypti*. Three of these mosquitoes were subsequently fed separately on three monkeys, two of which died of typical yellow fever. The vaccinated person, though bitten by certain infected mosquitoes showed no signs of any reaction a direct demonstration of the efficacy of this method of vaccination.

E. B.

NICOLLE (Charles) & LAIGRET (J) Vaccination contre la fièvre jaune à l'aide d'une seule inoculation du virus amaril vivant desséché et enrobé [Vaccination against Yellow Fever by Means of a Single Inoculation of Living Yellow Fever Virus, Dried and Coated] —Arch Inst Pasteur de Tunis 1936 Jan Vol. 25 No 1 pp 28-39

A detailed account of the method previously described [see this Bulletin 1935 Vol. 32 p 880]

In a footnote at the end of their paper the authors state that in November 1935 100 persons had been treated by this method of vaccination in France and large applications are in progress in French West Africa the Cameroons and the Lake Tchad region. The method now definitely selected is a single inoculation of dried virus simply coated in egg yolk.

E H

STEPANOPOULO (G J) Sur la vaccination contre la fièvre jaune. [Vaccination against Yellow Fever]—Bull Soc Path Exot 1936 Apr 1 Vol. 29 No 4 pp 359-360

A brief statement of the method of procedure in applying serum vaccination (as distinct from Laigret's method) against yellow fever at the Institut Pasteur Paris. Up to date 103 persons have been vaccinated and in general the treatment has not produced any very marked ill effects beyond the usual febrile reactions following any serum therapy in particularly sensitive patients. The only exception is the case described by MOLLARET [see below]. Yellow fever virus has never been recovered from the blood of any of the subjects

E H

1. DARRE (H) & MOLLARET (P) Etude clinique d'un cas de méningo-encéphalite au cours de la séro-vaccination anti amarile. Ménigité aiguë avec lymphocytose considérable modifications de la réaction du benzoin colloidal épilepsie narcolepsie et confusion mentale. Double poussée secondaire d'hypertension intra crânienne Guérison sans séquelles [A Clinical Study of a Case of Meningo-Encephalitis during the Course of Yellow Fever Serum-Vaccination.]—Bull Soc Path Exot 1936 Feb 12 Vol. 29 No 2 pp 169-176
- n. MOLLARET (P) with the collaboration of G M FINDLAY Étude étiologique et microbiologique d'un cas de méningo-encéphalite au cours de la séro-vaccination anti-amarile [An Etiological and Microbiological Study of a Case of Meningo-Encephalitis during the Course of Anti-Yellow Fever Serum Vaccination.]—Ibid pp 176-185

1. A description of the first case of a nervous accident observed in Professor PETIT's laboratory during the course of serum vaccination against yellow fever dating back to 1933

The patient a woman of 25 years developed nervous symptoms 11 days after the inoculation of horse immune serum and mouse yellow fever virus.

A study of the case showed the presence of an acute meningitis with considerable lymphocytosis modifications in the colloidal benzoin reaction epilepsy narcolepsy and mental confusion and intra-cranial

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A. J. Calu.

SYKES (C. B.) Insects in Aeroplanes. [Annex III to Report of Committee on Yellow Fever Pan-African Health Conference, Johannesburg, Nov. 20-30 1935]—Quarterly Bull. Health Organisation League of Nations Geneva 1936 Mar. Vol. 5 No. 1 pp. 79-88 [See this Bulletin 1936 Vol. 33 p. 343]

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E II

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v

that the case might well have been one of disseminated sclerosis were it not for the intensity of the vascular lesions in the cord, the flame-shaped ("en flambeaux") distribution of certain foci of degeneration together with the extent and degree of the cytolytic changes in the cells of the brain. The clinical symptoms and pathological lesions were thus those of disseminated encephalomyelitis rather than of multiple sclerosis.

G. M. Findley.

SAWYER (Wilbur A.) The Duration of Yellow Fever Immunity after Vaccination and after the Disease.—Reprinted from *Trop. Am. Amer. Physicians*. 1935. Vol. 50. 6 pp. With 4 charts.

The titration results for 144 specimens of serum from 45 persons vaccinated against yellow fever indicate that protective antibody becomes demonstrable one or two weeks after vaccination and rises rapidly for a month or six weeks. Soon after the peak there begins a definite and continuous descent at a steadily decreasing rate and towards the end of the fourth year the mean titre has fallen from between 64 and 128 to between 2 and 8, but the rate of fall has diminished until the curve is almost level. In two cases the immunity ceased to protect after two years and one person failed to develop any immunity, but the great majority would seem to be immune for at least four years, some possibly for life. For comparison with the duration of immunity after the natural disease, 69 specimens were collected from 53 persons who had had yellow fever on known date. The titres of the sera taken within four months of the onset of illness are in a class apart from those examined later. This group of sera was mainly from recent epidemics in Brazil and Colombia, and the height of their titres is very similar to that of vaccinated persons. On the whole, however, the attacks of yellow fever seem to be followed by a higher immunity and a slower fall in protective antibody titre than after vaccination but there seem to be differences in the effects produced by different strains of virus. The curve of the mean titre of sera of persons having had the disease several years previously, up to 35 years, shows an almost horizontal line between titres of 64 and 16 which confirms the general observation of the past that the immunity following an attack of yellow fever endures, as a rule, for life.

With regard to vaccination, it would seem to be a wise precaution to retest persons every two or three years, and to revaccinate if the protective power of the serum is low or absent.

E. H.

NICOLAU (S.), MATTHIS (M.) & BAFFET (O.) Modification des certaines propriétés d'une souche de virus amaril entretenue pendant près de quatre ans sur cobayes. [The Modifications of Certain Properties of a Yellow Fever Strain during nearly Four Years in Guinea-pigs.]—*C. R. Soc. Biol.* 1936. Vol. 122. No. 17. pp. 203-206. [12 refs.]

A study of the changes observed in the French strain of yellow fever virus after 35 passages in guineapigs. This study started in 1933 and has been continued to the present time.

At first numerous large inclusion bodies were found in the central nervous system of all infected guineapigs when inoculated intracerebrally with either the neurotropic or viscerotrophic strain. Towards the 10th passage there was a diminution in their number and eventually

the intranuclear bodies disappeared almost entirely from the neurons and in certain guinea-pigs it has been impossible to find a single nerve cell containing yellow fever inclusions but on the other hand they could always be found in the glial cells.

The incubation period has gradually lengthened from an average of 9.4 days duration from inoculation to death up to an average of 13 days duration

E H

LLOYD (Wray) THEILER (Max) & RICCI (N I) Modification of the Virulence of Yellow Fever Virus by Cultivation in Tissues *in vitro* —*Trans Roy Soc Trop Med & Hyg* 1936 Feb 29 Vol. 29 No 5 pp 481-529 With 4 graphs. [29 refs.]

A very detailed account of the changes in virulence undergone by yellow fever virus after cultivation during a period of 21 months and through more than 150 subcultures *in vitro* without any intercurrent animal passage

Pantropic yellow fever virus has been cultivated for more than 130 subcultures in media consisting of serum Tyrode solution and minced tissue of mouse embryo chicken embryo or adult mouse testis. The same strain has been grown also for more than 55 passages in a medium of serum Tyrode solution and minced adult guinea-pig testicular tissue and for more than 20 transfers in the same fluid medium and chicken embryo dermis

Neurotropic virus of both relatively early and late mouse passage has been cultivated for more than 120 subcultures in serum Tyrode solution and minced chicken embryo. Neurotropic virus of late mouse passage has been grown for 55 transfers in serum Tyrode solution and minced mouse embryo and also for 86 subcultures in Tyrode solution containing minced chicken embryo

The cultivated strains of pantropic yellow fever virus show consistently a progressive loss of the power to produce yellow fever in *rhesus* monkeys following inoculation. The neurotropic affinities of this virus in mice and monkeys however do not seem to increase during cultivation.

A strain of pantropic yellow fever virus grown for 92 subcultures in serum Tyrode solution containing mouse embryo tissue when passed for 30 transfers in *Macacus rhesus* only slowly regained its virulence for monkeys. The increase in virulence was shown by the death of 6 of these 30 monkeys. None of them died of yellow fever encephalitis. Monkeys become highly immunized against yellow fever if inoculated with the pantropic virus cultivated in mouse embryonic tissue together with human immune serum. Evident serum immunity can be produced by a dose of virus equivalent to 34 minimal lethal doses for a mouse and human immune serum (titre 128) in a ratio of 0.5 cc. per kilo body weight completely or nearly completely protects monkeys against the appearance of detectable virus in the circulating blood.

The antigenic power of neurotropic virus of mouse brain origin and cultivated pantropic virus grown in mouse embryonic tissue was found to be approximately the same when tested by inoculation into immune persons. The serum antibody titre with both rises rapidly after inoculation of the virus to reach a peak usually at 2 weeks and falls rapidly to its initial level at about 4 weeks.

The results of the immunization of 26 persons with pantropic yellow

fever virus cultivated in mouse embryonic tissue, in the presence of an existing passive immunity produced by the concomitant injection of a titrated quantity of human immune serum, are recorded in detail. The reactions following inoculation were minimal or absent. The sera of 13 individuals titrated for protective antibodies during the period from 14 to 28 days after inoculation showed titres ranging from 8 to +256.

This long article should be consulted in the original by all those interested in the subject as it contains details of the technique employed for the cultivation of yellow fever virus and the results obtained with various methods and different strains. E.H.

GORDON (John E.) & HOOCHES (Thomas P.) A Study of Inactivated Yellow Fever Virus as an Immunizing Agent.—*JL Immunity* 1936. Mar Vol. 30 No. 3 pp 221-234. With 2 figs. [18 refs.]

The authors inactivated yellow fever virus by means of heat, exposure to ultra violet light, and the action of formaldehyde, and tested the material by inoculation into both monkeys and mice. In no instance was any demonstrable immunity produced by inactivated virus and when immunity did occur it was the result of a demonstrated micro. Neither a solid nor a partial immunity followed the parenteral injection of large amounts of inactivated virus either of the viscerotropic or neurotropic form. E.H.

LLOYD (Wray) & MAHARRY (A. F.) Yellow Fever Virus Encephalitis in African and Asiatic Monkeys.—*Amer JL Trop Med* 1938 Jan. Vol. 16. No. 1 pp 73-75 [14 refs.]

A record of the production of experimental yellow fever virus encephalitis in one *Macacus cynomolgus*, one *Cercopithecus torquatus*, two *C. mona* and two *Erythrocebus patas*. All these monkeys were inoculated in the left frontal lobe with 0.5 to 1.0 cc. of a Berkfeld N filtrate of the brain of a mouse infected with neurotropic yellow fever virus after more than 200 passages in mice.

The monkeys died of encephalitis after 6 to 9 days and at death virus was isolated from the brain and either the sciatic or the optic nerve and also with one exception the adrenal. It was absent from the blood, cerebrospinal fluid and general viscera of those monkeys examined. All these animals are thus shown to be highly susceptible to neurotropic yellow fever virus. E.H.

MOLLARET (Pierre) *Le traitement de la fièvre jaune.*

This book was reviewed on p. 569

MISCELLANEOUS

JAMAICA. Report of the Bacteriological and Pathological Laboratory, 1935 [EVANS (K. Leigh) Govt. Bacteriologist & Pathologist] 3 typed pp 1935 Kingston.

The work of the laboratory as reported by Dr K. Leigh Evans has increased by nearly 50 per cent. in the total of specimens dealt with but these practically all were in connexion with routine clinical pathology. Of the 39 566 specimens examined 22 634 or 57.2 per cent. were from the General Hospital 3 440 or 8.7 from Health Officers and 2 958 or 7.4 per cent. from private practitioners. For diagnosis of syphilis the Kahn test is employed and the number of sera tested was nearly double that of the preceding year 15,366 in place of 8,842. The sera of all patients admitted to the Public Hospital Kingston are tested as a routine measure and nearly half (43 per cent.) gave a positive reaction. Tests were also carried out on placental blood of patients in the Maternity Hospital 1 166 in all. Comparative tests were undertaken in the latter part of the year with placental and venous blood. Of 218 so tested 52 were positive in blood taken by venous puncture of which 20 were negative with placental blood in one instance only did the reverse obtain.

Next in order came Widal tests for enteric fever these also have nearly doubled from 2 526 to 4 869. Between 44 and 45 per cent. were examinations for agglutinins to the *Bact. paratyphosum* such being carried out on all those negative to *Bact. typhosum* whose smears revealed no malaria parasites [why those negative to *Bact. typhosum* but showing malaria parasites should not be tested is not stated perhaps time could not be spared for this]. Information of value might however accrue for the combination of enteric fever and malaria may in some cases be very mild, in fact so mild clinically as to escape observation see this *Bulletin* 1920 Vol. 15 p. 252]. Of nearly eleven hundred sera tested only 8 were positive for *Bact. paratyphosum A* and 4 for *Bact. paratyphosum B*.

Blood examinations for malaria parasites totalled 4 478 as compared with 2,250 in 1934. About one third of these were in connexion with the work of the Malaria Commission. In addition those sending up sera for Widal tests were asked to send at the same time blood smears in order that malaria parasites might be looked for nearly one in three was positive in 1934 one in four.

The work of the laboratory staff was further increased by examinations of serological and bacteriological character necessitated by the opening in October of a Women's Clinic for Venereal Diseases.

Lastly experiments have been undertaken for the cultivation of *Mycobacterium tuberculosis* from sputa microscopically negative on Holmes's modification of Jensen's egg potato medium. H H S

MANSON (D). The Scope of an Assam Tea Garden Laboratory—
Indian Med Gaz 1935 Dec. Vol. 70 No. 12 pp 690-693

The expenses in running a tea-garden in Assam are great while for the good of the employees a medical laboratory is an essential nevertheless costly apparatus cannot be acquired and this account of what can be done in the way of routine investigation at small cost is worth placing on record. Where even this could not be afforded

by the owners of a small garden, several might club together to establish a laboratory in common. The author had three assistants, one qualified and two of the compounder class trained in the laboratory. During the past 5½ years there has been an annual average of 2,650 blood slides examined for malaria, of which 24·1 per cent were positive, malignant tertian predominating. In the same period of 5½ years 24,187 anophelines have been dissected and an infectivity survey made which showed that *A. maculipennis* was the only important vector. Skin reactions with members of the entomological group have proved very useful to correct diagnosis and the consequent treatment of cases of fever. Other routine examinations included faeces for helminthic infections and for bacterial isolation and sera for syphilitic infection. Finally when in 1934 Assam was visited by a widespread epidemic of malaria, serum was obtained at the laboratory from convalescents and administered to a large number (285) of contacts only three later contracted the infection.

H. H. S.

- ALVES (William D.) "O Agglutinins for *B. typhosus* in a Non-Inoculated Native Population.—*South African Med. J.* 1933, Jan. 11, Vol. 10, No. 1, p. 6.
 — T.A.B. and Brucella Agglutinins in an Unimmunized Indian Population.—*Ibid.* pp. 7-8.
 — "Normal" Agglutinins and their Bearing on the Diagnosis of Typhoid Fever by Agglutination Test.—*Ibid.* pp. 9-10. [This Summary appears also in *Bulletin of Hygiene*.]

In the first of these papers the author records the O agglutinins for *Bac. typhosus* in 300 sera obtained from natives of Southern Rhodesia, none of whom appeared to be suffering from typhoid infection, and none of whom had been previously inoculated. The results of these tests are summarized in Tables I and II.

TABLE I.

No. of sera	Negative	Percentage Positive				Total Percentage Positive
		1/50	1/125	1/250	1/500	
300	255	9.33	2.67	2	1	11

TABLE II.

Sex	No. of Sera	Positive				Total Percentage Positive
		1/50	1/125	1/250	1/500	
Male	174	10	8	3	1	14.42
Female	126	12	2	3	2	15.44

The second paper records the frequency of flagellar agglutinins at various titres, against *Bac. typhosum*, *Bac. paratyphosum A*, and *Bac. paratyphosum B* among a sample of 530 natives, who were not infected and non-vaccinated. A similar survey of 1,050 sera for agglutinins against *Bac. abortus* is included in the tabulated figures (Table I [III]).

TABLE I [III]

Bacterial suspension	No. of sera	Percentage Positive Titre				Total percentage positive
		1/50	1/125	1/250	1/500	
Bact typhosum	530	51	38	22	15	12.6
Bact paratyphosum A	530	—	—	—	—	—
Bact paratyphosum B	530	—	—	—	—	—
Bv abortus	1050	01	—	—	—	0.1

In the third paper the author discusses in the light of these findings the criteria that should be adopted in interpreting diagnostic agglutination tests for enteric infection in Southern Rhodesia emphasizing the essential point that such criteria can be laid down only when the level of normal agglutinins among the general population in the locality concerned is accurately known.

[Surveys of this kind are of the greatest value both from the practical point of view emphasized by the author and as an indication of the relative frequency of different types of enteric infection in different parts of the world.]

W W C Topley

YU (H) The Serum Treatment of Typhoid Fever.—*Chinese Med Jl* 1936 Feb Vol. 50 No. 2 pp 159-164

The author prepared the serum to be used according to Felix's technique injecting 1 cc of dried *Bact. typhosum* extract daily into a horse for 3 days pausing for 4 days then injecting 1 cc. of living organisms intravenously for 3 days and again resting and so on with increasing doses for 10 weeks. The agglutinin titre was then 1 in 25 600 and the animal was bled. The dosage used for treatment was 2-4 doses of 20-50 cc and the patients selected were those in an early stage of illness as soon as the diagnosis was certain i.e. patients with clinical symptoms of enteric fever proved by positive Widal and blood culture. Fifteen such patients were treated 8 showed definite improvement—fall in temperature and diminution of toxic symptoms 2 showed reduction of toxæmia but no fall in temperature 5 appeared to be unaffected. Four others were given serum received from Dr. FELIX they were given rather smaller doses. Two showed dramatic improvement, one was unaffected, the other showed an improvement in the toxic symptoms. The method is worthy of further trial.

H H S

BATG (S L) Tropische ziekten die niet in Nederlandsch Indië voorkomen.—*Genesek Tijdschr v Nederl Indië* 1936 Feb 4 Vol. 76 No. 3 pp 259-271

KUO (K W) TAKAHARA (K.) ADACHI (J.) & SATO (K.) Sweating with Heat Stroke.—*Jl Oriental Med* 1935 June Vol. 22, No. 6 [In Japanese pp 1147-1159 With 5 charts. (15 refs.) English summary pp. 98-99.]

An account of an investigation to determine the relationship between suppression of sweat and the development of heat stroke. The subjects (1974)

of the experiments were four healthy young men in whom heat stroke was produced on 16 occasions by exposure to dry bulb temperatures of from 40° to 72°C., and wet bulb temperatures of from 38° to 45°C. The observations were begun at ordinary room temperature, and the subjects were then suddenly introduced into a hot chamber where they remained until their condition became dangerous, or until acute discomfort made it impossible to continue the exposure. Within a few minutes of entering the hot chamber the rectal temperature commenced to rise at first slowly but soon with increasing rapidity until the maximum height of 39.5°-40.8°C. was reached. Sweating of the chest and axilla was produced immediately on entering the hot chamber, moderate in amount for the first 5 minutes, but increasing enormously and approaching the maximum during the following 15 or 20 minutes. With the onset of stupor the sweating decreased abruptly and approached suppression and at this stage the condition of the subjects became so critical as to compel the breaking off of the experiment. On returning to cool air the sweating suddenly recommenced (although the rectal temperature still remained high) and then diminished gradually. Such a suppression of sweat occurred in 7 out of 16 experiments and was found when the subject was about to fall into a condition of stupor. From this experiment the authors conclude that suppression of sweat has no causal significance in the production of heat stroke but is merely a phenomenon which occurs in heat stroke of a severe degree.

H. P. MacArthur

Lee (Douglas H. K.) The Human Organism and Hot Environments.
—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1935, June 29, Vol. 29,
No. 1, pp. 7-20 [38 refs.] Discussion pp. 20-30.

The author describes four crises which occur in physiological reactions to heat (1) Hyperpyrexia (2) Circulatory Insufficiency (3) Electrolyte Imbalance (4) Super Dehydration. The clinical syndromes which respond respectively to the foregoing are (1) True Heat Stroke (2) Heat Exhaustion (3) Heat Cramps (4) Dehydration.

Electrolyte Imbalance is defined as the lowering of the serum chloride concentration to 100 m.equa. (mille equivalent) per litre (=365 mpa per 100 cc.) or less. As has often been pointed out, the hypochloraemia is due primarily to replacement of the water lost in sweating without simultaneous replacement of the chloride.

Super-dehydration is defined as loss of water from the body to such an extent that continued existence is threatened should replacement not be effected. The critical point probably lies at about 20 to 25 per cent. of the body weight. Super-dehydration, among other results, brings about impairment of circulation and this in turn produces disordered metabolism, disordered nervous function and diminished heat loss. Through disordered metabolism an acidemia is set up with further damage to the nervous system which may be affected still further by rise of temperature. Nervous disturbances become increasingly manifest and may finally pass into coma and death.

Although a large number of cases belong to one category by virtue of the great majority of symptoms a good deal of overlapping between syndromes in any one case is probable owing to the diversity of climatic heat elements involved and the wide range of reaction possible in the human subject.

H. P. MacArthur

BECKETT (H. E.) Efficacy of Aluminium Paint for Exclusion of Solar Heat.—*Jl Inst Heating & Ventilating Engineers* 1935 Nov Vol. 3 No. 33 pp. 414-417 With 1 fig [Summary appears also in *Bulletin of Hygiene*]

In recent years aluminium paint has been used as a protection against over heating by the sun on the tops of omnibuses ambulances and other small enclosures. The research described shows that white paint is considerably better for this purpose than the particular make of aluminium paint used in the course of this research. It was also shown that aluminium paint should make a better finish for the insides of such roofs than the white paint normally used.

Wooden boxes 3 ft. 7 ins. square and 1 ft. deep were exposed to the sun. The boxes were covered with timplates one side or both sides of which were treated with the paints under consideration. The results were expressed by the relative temperature excess of the plates inside the box over the outside air. Taking the temperature excess where both surfaces of the timplates cover were painted black as 100 it was found that aluminium paint outside and white paint inside gave 66 whereas white paint outside and aluminium paint inside gave 19. The loss of petrol from cans painted with aluminium paint and with white paint the cans having small apertures in their tops gave results concordant with those found with the covered boxes.

T C Angus

BEER (F. J. Ch.) Een geval van de ziekte van Selter Swift Feer [A Case of Selter-Swift-Feer Disease]—*Geneesk Tijdschr v Nederl Indie* 1935 Oct. 29 Vol. 75 No. 22 pp. 1904-1909 [Summary appears also in *Bulletin of Hygiene*]

The eponymous nomenclature attached to the disease which is here considered covers that which is known very variously as trophodermatoneurosis vegetative neurosis of the child acrodynia pink disease erythroedema polynenritis and vegetative nervous system paralysis of children. It is a rare disease and merits record, but once seen is easily diagnosed thereafter. The symptoms in the author's case a child of 6½ years began after swimming they were typical except for oedema and an eosinophilia which might have been due to oxyuriasis.

This disease is one which usually makes its appearance between the ages of 6 months and 4 years. The first symptoms are psychical and involve change of character loss of interest in surroundings and peevishness. These are soon succeeded by myasthenic symptoms the child is first unable to stand and then to sit he cannot even hold up his head. Paraesthesiae such as formication and the feeling of burning in the palms and soles develop. Itching is a marked feature and there is a redness of the extremities due to vasodilatation ("Pink disease"). A very marked symptom is the sweating from which the child suffers and erythematous eruption. Symptoms are permanent but may undergo paroxysmal exacerbation. One feature of the disease tachycardia is practically never absent and the pulse may be 140 to 180. Other symptoms are polycythaemia, which may be due to the dehydration of sweating photophobia salivation bleeding from nose and gums loss of hair and sometimes gangrene. No alteration occurs in the cerebrospinal fluid. There may be slight hyperglycaemia, some diminution of blood phosphate and slight glycosuria.

Various clinical forms are distinguished—psychic, drowsy, paralytic, hyperaesthetic and eruptive (morbilloform or scarlatiniform).

Little is known of the aetiology and contagion seems ruled out, but an epidemic character may prevail. As causes, a neurotropic virus and vitaminic deficiency are incriminated. Yeast and irradiated ergosterol have produced benefit and again the still unknown factor may be contained in raw liver. The same syndrome has been reproduced in young rats on a full vitamin diet but with white of egg as the only protein. Raw liver can cure the rats directly.

Little is known of the pathology of the disease, for the patient usually recovers. Lesions are found in the adrenals, pituitary anterior and posterior horns of the spinal cord and in different ganglia. [See *Bulletin of Hygiene* 1933 Vol. 8 p. 851 1938 Vol. 11 p. 33.]

W. F. Horne.

DALE (W. C.) "Zipp" Treatment of Ulcers.—*West Africa* Vol. II
1935 Nov Vol. 8 No. 4 pp. 16-17

A method which gives promise of reducing time and expense in the treatment of ulcers in the tropics is worth an extensive trial. The author reports success with the use of "Zipp" (zinc oxide and iodine each 1 part, soft yellow paraffin 2 parts). It seems to heal rapidly almost all forms of chronic ulcer except those with circular edges and clean cut edges which are very likely syphilitic. The method of application is given in the following words—

The Zipp is spread thickly on three or four thicknesses of gauze, cut to a size to cover completely the whole ulcerated surface. This is pressed evenly on to the part affected. Then a bandage made of several thicknesses of gauze is bound evenly and fairly firmly over it. The object of this is to absorb the discharge from the ulcer. Then a plaster of Paris bandage is applied firmly. The gauze prevents any undue pressure from the plaster.

If possible the dressings should be left for 3 weeks or even longer, by which time the ulcer may be found healed. If there is sloughing, the bandage may need taking down and a new one being applied after a week, at all events as soon as any discharge appears on the surface of the plaster or tracks down below the lower end of the plaster. Four cases are detailed and reference is made to others in whom ulcers of over a year's duration cleared up after 2 or 3 applications among them is a boy with an ulcer exposing the bones about the ankle whose condition healed without impairment of movement.

Dr BEAUCIE of the Wesley Guild Hospital, Ileaha, also reports very favourably upon the method but he uses the ingredients in the proportions of 2, 1, 3 instead of 1, 1, 2, thus having a smaller proportion of iodine and he finds strapping as serviceable as plaster of Paris bandages.

H. H. S.

FUSCO (G) & CHIOPETTI (U) Il trattamento dell' ulcera tropicale con la bals. [The Bals Treatment of Tropical Ulcer]—Arch. Ital. Sci. Med. Colon. 1935 Nov Vol. 18 No. 11 pp. 816-818.

The ways suggested for treating tropical ulcer are legion, they may be grouped under five heads—general such as dietetic and toxic, local application of drugs, surgical methods, physical as by congestion, pressure, light and specific as by vaccines. In Italian Somaliland

tropical ulcer is very prevalent, some 10 per cent. of the native population being affected. The bile treatment is in essentials a form of vaccine. The use of bile in reducing virulence of organisms is a widely held belief and the author's idea is that by local application of bile the organism or organisms responsible for the ulcer are reduced in virulence but thereby lose none of their antigenic powers in other words the bile brings about vaccination by living organisms of lowered virulence. The ox bile is heated in a water bath at 100°C for 10 minutes when cool it is applied drop by drop on the ulcer and the wound covered with an ordinary bandage. The application is made daily or on alternate days. Cure it is said takes place in a few days with an average-sized ulcer and in 20-30 days in the more severe. The pain is eased as a rule after the first application.

H H S

ESCOMEL (E) Gastro-entéro-éclite produite par l'ingestion du *Tyroglyphus farinace* [Gastro-enteritis due to *Tyroglyphus farinace*].—
Bull Soc Path Exot 1935 Oct 9 Vol 28 No 8 pp 715-717 [Summary appears also in *Bulletin of Hygiene*]

The author was called to attend a woman who was suffering from intense abdominal pain accompanied by nausea profuse diarrhoea, and great prostration. There was marked tenderness in the abdomen. Examination of the stools revealed large numbers of arthropods which proved to be acarids in various stages adult females 650 by 320 μ adult males 350 by 160 μ nymphs 200 μ long and eggs double-contoured, 50 by 60 μ . They proved to be stages of *Tyroglyphus farinace*. This parasite has been found in damaged flour in muscovado (unrefined) sugar in dried raisins almonds cheese etc. The cause in the case described was dried raisins. The best treatment was elimination by means of a purgative of an oily (not saline) nature such as liquid paraffin other treatment being sedative for the pain and gastric distress e.g. bismuth and opium. The parasite is said to exert its action partly by mechanical irritation and partly by a poison which it secretes or excretes.

H H S

HAWAED (Abdul) Eosinophilia of Undetermined Origin.—*Jl Indian Med Assoc* 1935 Dec Vol 5 No 3 pp 99-100

A puzzling case is recorded. A man of 30 years a Madrasi was admitted to hospital on account of fever of four days duration. No diagnosis was made but the patient was discharged as cured five days later. After an interval of six weeks he was again admitted "for fever" and discharged cured after 4 days. Again no diagnosis was reached. History and physical signs were negative except for a very high degree of eosinophilia with leucocytosis. He had never had asthma or any skin disease there were no tubercle bacilli found in repeated examination of the sputum, no signs of any helminthic infestation. Nevertheless though the erythrocytes were little reduced the number varying between 3 400 000 and 4 680 000 per cmm the white cells ranged between 31,300 and 50,000 of which polymorphonuclears constituted 5-19 per cent. lymphocytes 8-18 and eosinophiles up to 87 per cent. and never below 69 per cent. The author is keeping the patient under observation and future developments will be of interest.

H H S

Various clinical forms are distinguished—psychic, clastic, paralytic, hyperaesthetic, and eruptive (morbilliform or scarlatiniform).

Little is known of the aetiology and contagion seems ruled out, but an epidemic character may prevail. As causes a neurotropic virus and vitaminic deficiency are incriminated. Yeast and irradiated ergosterol have produced benefit and again the still unknown factor may be contained in raw liver. The same syndrome has been reproduced in young rats on a full vitamin diet but with white of egg as the only protein. Raw liver can cure the rats directly.

Little is known of the pathology of the disease, for the patient usually recovers. Lesions are found in the adrenals, pituitary anterior and posterior horns of the spinal cord and in different ganglia. [See *Bulletin of Hygiene* 1933 Vol. 8, p. 551 1936, Vol. 11 p. 38]

W. F. Harry.

DALE (W. C.) "Zipp Treatment of Ulcers.—West Africa Med J. 1935 Nov Vol. 8, No. 4 pp. 16-17

A method which gives promise of reducing time and expense in the treatment of ulcers in the tropics is worth an extensive trial. The author reports success with the use of "Zipp" (zinc oxide and iodoform each 1 part, soft yellow paraffin 2 parts). It seems to heal rapidly almost all forms of chronic ulcer except those with circular edges and clean cut edges which are very likely syphilitic. The method of application is given in the following words—

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H. H. S.

FUSCO (G) & CHIONETTI (U) Il trattamento dell' ulcera tropicale con la bile. [The Bile Treatment of Tropical Ulcer]—Arch. Ital. Sc. Med. Colon 1935 Nov Vol. 16, No. 11 pp. 816-818.

The ways suggested for treating tropical ulcer are legion, they may be grouped under five heads—general such as dietetic and toxic, local application of drugs, surgical methods, physical as by congestion, pressure light, and specific as by vaccines. In Italian Socio-Health

A. venenata and to the extract which contains the glucoside ouabain other vegetal extracts may be added and sometimes snake venom. The root is generally used and the toxin is a potent one killing in a few minutes by arresting the heart's action after causing rapid, laboured breathing and convulsions if made from the bark the poison causes similar symptoms with loss of muscular power but without convulsions.]

H H S

WOLFF (E. K.) & AUSTIN (L. D. C.) Preservation of Pathological Museum Specimens under Tropical Conditions—*Ceylon Jl Sc* (Sect. D Med Sci.) 1935 Dec 3 Vol 3 Pt 4 pp 243-247 [Summary appears also in *Bulletin of Hygiene*]

Preservation of pathological specimens is a puzzling problem in the tropics especially when there is a desire to conserve the colours. Kaisering Jores Pick and other fluids all have their drawbacks and at times prove unsatisfactory. The authors have tried to determine what factors are responsible for preservation of the colours of tissues and found that none of the ingredients of Jores could be omitted. The reaction of the fluid however was found to vary and they prepared a neutral fixative by adding finally sufficient NaHCO_3 to produce a fluid with pH 7.0-7.2. The composition was Sodium sulphate 220 gm. sodium chloride 90 gm. potassium sulphate 10 gm. chloral hydrate (saturated solution) 500 cc. formalin 2 000 cc water 10 000 cc. and sodium carbonate to neutrality (20-80 gm.) Even this did not remain neutral in the presence of organic matter and the specimens after a time turned brown but less if there was plenty of blood. Fresh ox blood was added therefore but while retaining the red of the haemoglobin pale tissues (e.g. brain) became yellow. Substitution of blood serum 10 cc to every 100 cc solution for the ox blood has proved very satisfactory especially if watch is kept on the reaction and NaHCO_3 added when the pH falls below 7.0. It keeps for a long time and when it is failing can be restored by occasional addition of chloral and formalin. Care must be taken to see that the fixative penetrates well. For mounting a 3 per cent. NaCl in distilled water proved satisfactory the crude salt may be used, and a 35 per cent. solution is saturated this is repeatedly filtered cleaned with animal charcoal and refiltered. It is kept in this strength as stock and diluted as required. Any tendency to blueness is counteracted by adding a few drops of 2 per cent potassium bichromate solution. The whole is sealed with Aquatex or a compound of asbestos powder pitch and linseed oil.

The steps are summarized as follows —

- 1 The specimens are carefully prepared and dressed.
- 2 They are hardened in neutralized and buffered fixing solution for one to seven days.
- 3 They are next washed in running water for three to twenty four hours.
- 4 If necessary they are placed in rectified spirits to improve the colour.
- 5 They are passed through several changes of 3 per cent. sodium chloride solution.
- 6 They are finally mounted in 3 per cent. sodium chloride solution, thymol menthol benzine solution sprinkled on the surface of the mounting fluid and the jar closed air tight with Aquatex.

H H S

CARRONCORA (Giovanni) Epatosplenomegalie tropicale ed epizootica—
Riforma Med. 1935 Nov 23 Vol. 51 No. 47 pp 1730-1735

POCAT (Igloo) Contributo all'anatomia patologica dell'animale—
Ital. Sci. Med. Colon. e Parasit. 1936 Feb Vol. 17 No. 2
pp 115-120 With 4 figs.

SMITH (Harry S.) The Role of Biotic Factors in the Determination
of Population Densities.—*Jl. Econom. Entom.* 1935 Dec
Vol. 28 No. 6 pp 873-898. With 5 figs. [16 refs.]

The paper is of a theoretical nature. It considers an idealized population of insects and studies the complex factors which may affect that population at different densities.

The author draws a clear distinction between those factors which affect the population of insects to a constant extent and those other factors the effect of which is increased (or decreased) as the density of insects increases. The factors in the first group those independent of density are mainly climatic for instance a drought or a fire may be assumed to kill the same proportion of an insect population whether it be sparse or dense such a factor cannot for long affect the density of population because it will increase rapidly to a state of equilibrium. It is only the factors which are dependent on the density that can make a permanent effect upon the equilibrium of the population these factors are mostly biological and they include such things as the effect of parasites and predators and the competition which may exist between individuals of the population which is being studied.

The paper is perhaps hardly suitable for abstraction, but it is an important one helping us to understand some of the laws of increase of population a subject fundamental to applied entomology

P. A. Butcher.

ROUX (E.) Le problème hygiénique des moustiques urbains
[Urban Mosquitoes and Public Health].—*Rev. d'Hyp. et de l'Hyg. Préventive* 1936 Feb Vol. 53 No. 2 pp. 102-112

The author discusses the nuisance caused by urban mosquitoes in French cities and the special problem of control.

It appears that only two species of mosquito need be considered. Of these the Yellow Fever mosquito (*Aedes aegypti*) is of minor importance and confined to the south of France. The common house *Culex pipiens* is widely distributed and a serious nuisance to the inhabitants of most towns and cities. In urban areas the representatives of this mosquito belong to the autogenous race, which can lay eggs without a blood meal, bat bites man readily and breeds in heavily contaminated waters. The early stages may be found in a great variety of places, among which sewers, cess-pits, pit privies and blocked drains are important. The problem of reducing this mosquito, which is discussed at some length, is very difficult because of the existence of many potential breeding places and the need for recurrent attention to them.

P. A. Butcher.

WEYER (Fr) Einige Erfahrungen bei der Aufzucht von Stechmückenlarven. [Practical Rearing of Mosquito Larvae.]—*Zent f Bakteriol I Abt Orig* 1936 Feb 13 Vol 136 No 1/2 pp. 111-116 With 2 figs.

Hay infusion is very satisfactory for the rearing of *Culex pipiens* and *C. fatigans*. For *Anopheles* larvae (*A. maculipennis*) the best results have been obtained with water containing a rich culture of saprophytic algae. If a little powdered liver or other animal substance is added to water containing such algae these grow rapidly. They provide abundant food for the larvae and at the same time keep the water thoroughly aerated so that it need not be changed.

V B Wigglesworth.

FREEBORN (Stanley B) & BERRY (Lester J) Color Preferences of the House Fly *Musca domestica* L.—*Jl Econom Entom* 1935 Dec Vol 28 No 6 pp 913-916. With 1 fig

It is a common practice among California dairymen to use aluminium paint on the walls as a repellent for house flies. Experiments in which a chequer board of coloured squares was set up in the dairy barn showed that aluminium paint has no particular value as a fly repellent. The flies prefer dark colours and rough surfaces.

V B Wigglesworth

WILLIAMS (C B) & MILNE (P S) A Mechanical Insect Trap.—*Bull Entom Res* 1935 Dec Vol 26 Pt 4 pp 543-551 With 3 text figs. & 2 figs on 1 plate.

DAVIES (W Maldwyn) A Water-Power Mechanical Insect Trap.—*Ibid* pp 553-557 With 9 text figs. & 2 figs on 1 plate

These papers describe mechanical devices which cause large funnel shaped nets to sweep through the air. The propulsion is by electricity or water and the methods of construction are illustrated. With either apparatus large numbers of small flying insects may be collected and a study may be made of those which are in flight during particular periods of the day or night. The work is mentioned here because of its potential value to those who wish to sample populations of flying insects for instance mosquitoes.

P A Buxton

ZUMPT (F) Beobachtungen ueber Mückenbrutplaetze in der Tikoebene (Kamerun).—*Arch f Schiffs- u Trop Hyg* 1936 Mar Vol 40 No 3 pp 113-118

BISHOP (F C) Ticks and the Role they play in the Transmission of Disease.—*Smithsonian Rep* 1933 Publication 3278 pp 389-406 With 9 plates & 1 fig (map)

BUXTON (P A) Studies on Populations of Headlice. (*Pediculus humanus capitis* Anoplura) I.—*Parasitology* 1936 Jan Vol 28 No 1 pp 92-97

The number of headlice in crops of hair from individual people in London and Lagos has been estimated by a new method.

The method consists of obtaining a standard crop of hair (from army recruits admitted into the Woolwich Depot and from post-mortem subjects in Lagos, West Africa) dissolving it completely in a solution of 50 gm. potassium hydroxide and 100 gm. sodium sulphide in 1 litre of tap water filtering out the lice with a funnel of stainless steel gauze, sixty meshes to the linear inch, and counting the louse population. No lice were found in 235 specimens from Woolwich recruits collected in all months of the year. Twenty per cent. of the specimens from Lagos contained lice the number of lice ranging from 1 to 1,286. Lice were more prevalent on the females—due probably to their rather permanent head-dressing. There was no significant difference between the different races of Africans in Lagos nor at different seasons. This last result was expected, because the climatic conditions are so equable. Data from other parts of the world will be published later.

V. B. Wigglaswick

LANCET 1938, Feb. 8, pp. 330-331 The Tropical House. In Object Lesson at Liverpool. [Summary appears also in British Hygiene.]

Professor BLACKLOCK in a Chadwick lecture last year indicated many diseases traceable to housing defects—inadequate lighting, ventilation, draughts, damp etc.—but in the tropics the dangers are greater because of the facilities afforded to breeding of insect vectors of specific disease. Three years ago these points were brought out in more detail by Professor BLACKLOCK in his book on *The House and Villages in the Tropics* (see this Bulletin 1933 Vol. 30 p. 39) and now the matter will receive still greater attention for the Liverpool School of Tropical Medicine has rented land on which to build small replicas of houses and in different parts of the tropics, to illustrate the conditions associated therewith which may lead to the production or spread of disease. Here students going to Liverpool to study tropical medicine and hygiene persons, medical and lay purposing to go to the tropics to live, may see the dangers and risks to which they may be subjected from faulty house-construction and learn how to avoid or combat them.

H. B. S.

WALKER (F.) & DIXON (D. Strangeways). The Bug-Proof Construction of Native Dwellings.—*East African Med. J.* 1938, Feb. Vol. 12, No. 11 pp. 344-347 With 2 figs.

A paper of practical importance in the tropics generally and for those responsible for the housing of natives in particular. The authors had in view the designing and construction of buildings having a minimum of suitable breeding sites for bugs, i.e. elimination, as far as possible, of cracks and crevices. For doors and door-frames the usual design is unsuitable because of space being left between the frame and the wall. If this space is enlarged it ceases to harbour bugs. This is accomplished by dispensing altogether with door frames and swinging the door on vertical pins about $1\frac{1}{2}$ inches from the normal hinge. When open, the door is $\frac{1}{2}$ inch from the doorway and when closed it completely fills the doorway.

For the bunk system of beds lower bed boards are supported on dwarf walls bonded into the main walls which are plastered and corners rounded. Upper bed boards are supported on angle irons bolted to the main walls the beds are made of three boards of 10 by 1½ inch timber not bolted but laid on the angle or dwarf wall supports. For roofs the usually employed wall plates are not necessary and the space between them and the wall is a favoured breeding site for bugs. If they are not used the tops of the walls can be rounded and plastered. If roof trusses are necessary they should not run up to the gable ends close to the walls if they are not used the purlins instead of resting on the partition walls (as is customary) should be carried on short pieces of angle iron bolted to the walls being thus some 3 inches above the walls and allowing the walls to be rounded off. In plastering all corners should be smooth and rounded off as a rule when both sides of a wall are plastered the plaster is pushed above the level of the top of the wall leaving a cavity which harbours bugs innumerable The figures in the article demonstrate the points referred to

H H S

REVIEWS AND NOTICES.

BURKE-GAFFNEY (H. J. O'D) [B.A. M.D., B.Ch. R.A.O. (Dob). Senior Pathologist Tanganyika Territory] An Outline of Clinical Pathology for African Medical Assistants.—124 pp. With 11 coloured plates & 5 charts. 1938. Dar-es-Salaam Govt. Printer.

Dr Burke-Gaffney has published in book form his course of lectures delivered to East African Hospital Assistants undergoing training. With the material at his disposal with the type of student whom it is his duty to instruct this course must have been difficult to plan and still more difficult to carry out because the author would be called upon to steer an even course between the Scylla of too much specialism and the Charybdis of insufficient information, and to accomplish this demands wide knowledge of the subject and the pupil, together with a high degree of selective acumen. The work must essentially be practical and at each stage of the teaching the apparatus of the investigation made to clinical medicine must be brought home to the student so that he may be impressed from the first with the fact that pathology is not for him at least, a subject divorced from practical clinical medicine.

Dr Burke-Gaffney is to be congratulated on the success with which he has accomplished the task he set out to perform. He leads the student by the natural path of biological principles and the elements of medical zoology, to the elements of clinical pathology, explains the use of and care for the microscope. He then, to use a term beloved of politicians, explores the various avenues revealed and stokes in turn the blood in health and disease the faeces, mucus of excretions and information obtainable thereby—the urine, pus, exudates, effusions and transudations, the respiratory tract and its secretions, the skin and mucous surfaces bacteria and so leads on to a brief but adequate account of the principles of immunity. A very useful general chapter is that on Laboratory Routine which includes equipment, modes of collecting and preserving specimens and so forth. In appendices are indicated the nature of examinations likely to afford the most useful information in the conditions present to which the hospital assistant will often have recourse. The composition of stock solutions will save his having to turn to larger manuals and the formulae for dilution and for converting a stronger into a weaker solution of known strength are of great value and will save much waste of material. Sketches of the more important technical procedures—red and white blood cell counts, Widal test, etc.—are given, and finally a glossary of some of the more important terms in general use.

One or two small points may be mentioned, as hints for future editions which will doubtless be called for. Polymorphonuclear leucocytes are termed polymorphs, *tout court* all through the book, though the word is not mentioned in glossary or index to chapter II, and on p. 81 we have "polymorph pus." On p. 33 schizogony would be better than sporulation, and in fact 5 lines after the latter is used the former is given but not explained. The organism of relapsing fever is a spirochaete not a spiroillum (p. 38). Faeces is a plural noun (p. 44). *p.* is not defined till we come to p. 119 and it is not mentioned in the glossary though repeatedly used in the text from p. 26 onwards. *Tarsonis solium* (p. 50) has a double circle of hooklets. *Hymenolepis*

only one. When speaking of sputum nummular is mentioned but not defined nor given in the glossary. The term cyst is defined as a stage in the life history of certain protozoa (in the glossary) though it will often be met with in other senses by the hospital assistant e.g. hydatid ovarian sebaceous dermoid and so on. Some of the illustrations might be improved e.g. that of ancylostoma (plate 6) and leprosy (plate 10). As stated these are small blemishes in an excellent and painstaking work. The book is handy, convenient and well printed and those for whom it has been produced will find it invaluable not only in their training but for keeping by them for frequent reference.

H H S

- i. CHOPRA (R. N.) [C.I.E. K.H.P. M.D. (Cantab.) M.R.C.P. (Lond.) Brevet-Colonel I.M.S. etc.] *A Handbook of Tropical Therapeutics*.—pp. xxi + 1748 1936 Calcutta Art Press 20 British Indian Street. [Rs. 25]
- ii CALCUTTA SCHOOL OF TROPICAL MEDICINE & CARMICHAEL HOSPITAL FOR TROPICAL DISEASES *Pharmacopoeia and Guide* pp. xi + 153 1936. Calcutta Art Press [Rs. 2/8/-]

i. The author of this book who has already contributed much to the elucidation of many problems in the therapy of tropical diseases is the Director and Professor of pharmacology and therapeutics at the Calcutta School of Tropical Medicine. In this work he gives a very complete account of the present-day treatment of these diseases. The book is very well written and, in spite of its great length it will be read with much interest almost from cover to cover. The title is rather misleading, much more is included than one is accustomed to find in a work on medical treatment and its scope is not restricted to the tropics.

The book begins with an account of the general principles of the action of drugs and other therapeutic measures, the different methods of administration of remedies, diet, physical methods of treatment and so on. It includes a very detailed and practical account of blood transfusion, and an interesting description and criticism of the dietary of Indians. The next four sections of the book are concerned with the treatment of helminthic infections, diseases caused by protozoa, bacterial and virus diseases, nutritional and miscellaneous diseases of the tropics. In part VI diseases of the skin are dealt with. Then follows a section of nearly 300 pages which is described as a dictionary of diagnosis and treatment of more or less cosmopolitan diseases. The book ends with two long appendices containing a large amount of useful information some of which, however, appears rather incongruously in this setting.

Probably most readers of a new book on any branch of tropical medicine will turn first of all to the subject of malaria. Dr Chopra's account of the treatment of this disease is among the best that have appeared so far and it bears unmistakable evidence of his own experience and critical power of judgment. Quinine and the other alkaloids of cinchona bark are well discussed and the author's studies of the action of plasmoquin and atebrin mark a distinct advance in the knowledge of the action of these drugs. The treatment of amoebic dysentery, cholera, plague, leprosy and beriberi is described at some length and with much information of practical importance. There is a full account

of anthelmintics their respective merits and the modes of administration of them and an interesting discussion of the action of salts of antimony in the treatment of kala azar a subject to which the author has made notable contributions. There is a well-balanced section on vitamins, with a caution against the indiscriminate and excessive use of proprietary preparations of these substances. The treatment of nearly all the other diseases of the tropics is adequately and in some cases almost exhaustively described. At the end of the book some prescriptions are given, taken from the pharmacopoeia of the Calcutta School of Tropical Medicine and a short account of some new and non-official drugs and preparations.

Colonel Chopra states in his preface that his book is intended to serve as a work of reference for practitioners and to serve the requirements of senior students there can be no doubt that it achieves both these objects. The book is such a good one that it can be recommended with confidence there must be few medical men who can read it without profit.

A Handbook of 1750 pages! It is well printed and finely bound, but it is so heavy and so thick that it is very inconvenient to handle and read in a future edition it would be better if it were split in two volumes.

ii. A small book of prescriptions to use at the Carmichael Hospital, Calcutta with brief directions for the treatment of tropical and other diseases, for blood examination administration of test meals and other clinical procedures. A considerable proportion of the information given is included also in the Appendix of the larger work reviewed above.

H. J. Walker

CALCUTTA. Annual Report of the Calcutta School of Tropical Medicine and the Carmichael Hospital for Tropical Diseases 1935 (Carmichael (R. V.) Director) — 191 pp. With 2 figs. 6 graphs & 1 photo. 1936. Alipore Bengal Govt. Press.

The main objects for which the Calcutta School of Tropical Medicine was established are post-graduate teaching and research in tropical diseases. Most of its professors have been allotted beds in the Carmichael Hospital for Tropical Diseases, so that they are able to bring into practical application in treatment the results of their researches. The Annual Report for 1935 deals with the School's activities both as a post-graduate teaching centre and as a research organization. During the year investigations have been made on epidemic dengue, cerebrospinal meningitis, full diarrhoea, malaria, drug addiction, indigenous drugs, kala azar, hookworm, leprosy, bowel disease, diabetes, filariasis, and other problems. Details of much of the work referred to have been given in papers and memoirs by members of the staff of the School published in the *Indian Journal of Medical Research* and the *Indian Medical Gazette* during 1935 and noted in this Bulletin in the appropriate sections. These papers and memoirs have been bound up in reprint form, and are indexed with the Annual Report as Appendix A containing 19 papers from *Indian Journal of Medical Research* and Appendix B containing 30 papers from the *Indian Medical Gazette*.

R. L. C.

NEVEU LEMAIRE (M) [Professeur Agrégé Chef des Travaux de Parasitologie à la Faculté de Médecine de Paris] *Traité d'Helminthologie Médicale et Vétérinaire* [Treatise on Medical and Veterinary Helminthology]—pp xxii + 1514 With 787 figs. 1936. Paris Vigot Frères, 23 rue de l'Ecole-de Médecine. [175 francs.]

The purpose a difficult one of the author is to get into one book an account of the biology systematic position and ill effects on their hosts definitive and intermediate of the helminths of man and of domestic animals. Part I General Helminthology goes into the many aspects of the question in 70 pages. Part II Special Helminthology covers the systematic zoology of helminths (with many and good illustrations and a number of useful keys for the recognition of genera and species) and some consideration of disease which may be caused by the worms—a most useful compilation of nearly 1,300 pages. Part III of 40 pages gives a check list of helminths which make use of each particular animal as a definitive host and Part IV of 70 pages does the same for animals which are intermediate hosts with illustrations of a number of them A short bibliography and an index complete a book of systematic value which will soon need rebinding if it has much use.

Clayton Lane

REIS (J) & NOARECA (P) with the collaboration of A S REIS *Doenças das aves (tratado de ornithopathologia)* Secção de ornithopathologia do Instituto Biológico [Treatise on the Diseases of Birds]—468 pp. With 359 figs. & 4 coloured plates. 1936. São Paulo

Some four years ago the authors issued a work on the diseases of birds directed to assist those engaged in breeding of birds and in avi culture generally and consequently of a popular rather than of a strictly scientific character. The present treatise is not merely an amplification of the older work it is an entirely new undertaking on scientific lines and one which is greatly needed. Each chapter is as complete as the experience of the authors and a wide search of the literature have been able to make it. Articles on the matters dealt with are published in many languages often buried in less well-known journals and difficult to come by hence the greater credit to the authors for having succeeded so well.

The work is divided into sections each subdivided for purposes of description. The first deals with virus diseases the second with bacterial and then in order the eumycetic conditions protozoal helminthic and nutritional with interspersed chapters on parasitic arthropods and pathological anatomy and histology. Not only is each section but each chapter a mine of information. There are four coloured plates and over 300 illustrations in the text. Each chapter is well documented and there is a full and carefully prepared index. Further not only is the condition in the bird described but interesting points are brought out of great interest to comparative pathology. In short the work is indispensable to research workers engaged in veterinary or comparative pathology and will be invaluable to pathologists at Zoological Gardens. It would have been a veritable godsend to the reviewer when he held the post of pathologist to the Zoological Society of London. The fact that it is in the Portuguese language should not

deter those little acquainted with that tongue from getting and studying the book. The text is easy to read and the illustrations abundant and clear. We hope the authors will find sufficient encouragement from its reception to arrange for translation. [The price is not stated.]

H. H. S.

BARNARD (Cyril C.) [B.A. (Lond.) Univ. Dipl. in Librarianship F.L.I., Librarian London School of Hygiene & Tropical Medicine, etc.] A Classification for Medical Libraries, with Introduction, Local List, Index of Parasites and General Index. Being a Thesis accepted for the Diploma with Honours of the Library Association (1931).—142 pp. 1936. London Percy Lund, Humphreys & Co. Ltd., 12 Bedford Square W.C.1 [10s. 6d.] [Review appears also in *Bulletin of Hygiene*.]

The purpose of any library classification is to provide a plan for the orderly arrangement of the books. An ideal plan would bring together in one place all the publications on a particular subject, where they would be neighboured by publications on closely related subjects thus providing by a logical sequence of arrangement a ready means of ascertaining the scope and nature of the literature relevant to any topic of enquiry. This ideal may be unattainable for a difficulty common to all systems of library classification is that authors rarely confine themselves to one subject in one book and yet a book can have but one place on the shelves. Mr. Barnard's scheme of classification does however come as near as possible to being a perfect one for medical libraries. Its underlying principle is that of specific entry i.e., one place for each topic under which are grouped all its aspects. In this it greatly improves on older systems such as Dewey's and the Brussels' Universal Decimal Classification which, for medicine at least, tend to disperse rather than gather together the literature of a subject by introducing such subdivisions as anatomy, physiology, pathology, surgery, etc. and distributing books under these various heads. Dewey and the Brussels' classification are based on theoretical concepts accepted fifty or more years ago but now out of date. Mr. Barnard's system of classification on the other hand is the result of twenty-five years of practical experience in four medical libraries of very different type, and is in actual use in the library of which he has charge at the London School of Hygiene and Tropical Medicine. Besides the synopsis and main schedules of the scheme the volume contains a full explanatory introduction, local list, index of parasites, and general index, so that by their aid users can quickly assign books and pamphlets to their appropriate places in the classification. As a "Classification for Medical Libraries" Mr. Barnard's book is both practical and thorough, and full of possibilities of usefulness to anyone wishing to arrange and classify a collection of medical publications either large or small.

R. L. S.

BUREAU OF HYGIENE AND TROPICAL DISEASES

TROPICAL DISEASES
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No 9

SLEEPING SICKNESS

UGANDA PROTECTORATE Annual Report of the Human Trypanosomiasis Research Institute for the Year ended 31st December 1935 [DKE (H. Lyndhurst) Director — 11 pp 1936 Entebbe. Govt. Printer Shs. 1 50]

This report covers the last year of the life of the Human Trypanosomiasis Institute at Entebbe.

The year was spent in an attempt to complete certain lines of research, in the conclusion of the investigation of the efficacy of Bayer 205 as a prophylactic against the trypanosomes of man and a continuation of the study of antelope as a reservoir of these trypanosomes. All this work has already been published, and has received notice in this *Bulletin*

R. Yorke

COCO BELGE RAPPORT SUR L'HYGIÈNE PUBLIQUE AU COCO BELGE PENDANT L'ANNÉE 1934 VAN HOOF (L.) Trypanosomiasis pp 22-35 With 1 map 'Trypanosomiasis in the Belgian Congo during 1934'

Eight European cases of trypanosomiasis were discovered during 1934 as compared with 12 in 1933 and 7 in 1932. In a table information is given in respect of the years 1927 to 1934 of the number of natives examined of the number of old cases seen and treated, of the number of new cases discovered and of the index of new infection. During the year 1934 3,824,097 patients were examined 86,147 old cases were seen and treated 24,101 new cases were discovered, and the index of new infection was 0.63 per cent

In a series of tables information is given regarding the state of affairs in the different provinces. On the whole the situation appears to be satisfactory. There is a progressive lowering of the index of new infection. van Hoof however records a warning that it would be unwise to draw unduly optimistic conclusions. Experience has shown that although the initial work may rapidly reduce the new infection rate constant work is necessary to maintain the position. If vigilance is relaxed because of too great confidence in the stability of the results obtained the disease may suddenly flare up again with the intensity of an epidemic.

A good deal of detailed information regarding the incidence and progress of the disease in the various portions of the Belgian Congo is supplied in the report which must be consulted in the original by those interested.

DUPUY La maladie du sommeil dans les régions soumises à l'action du fonds Reine Elisabeth pour l'assistance médicale aux indigènes du Congo Belge. [Sleeping Sickness in the Regions dealt with by the Queen Elizabeth Funds for the Medical Assistance of the Indians of the Belgian Congo.]—*Ann Soc Belge de Med. Trop.* 1935 Mar 31 Vol. 16. No. 1 pp. 47-82.

This report describes the sleeping sickness work of the Forest during 1934 [this *Bulletin* 1935 Vol. 32, p. 682]. During the course of the year 744 717 natives were examined and 4 778 new cases of trypanosomiasis discovered—the contagious index for the year was therefore 0.618 per cent.

The number of old cases on 31st December 1933 was 12,886, and of these 2,041 were put on treatment. In all 19 703 patients were treated during the year. The total endemic index was 2.35 per cent. as compared with 1.86 per cent. in 1933. The number of provisionally cured patients was 12,975 and the efficacy rate was accordingly 63.81 per cent. A number (489) of patients disappeared during treatment, 370 died and 5,899 patients remained on treatment at the end of the year, the maintained endemicity index thus being 0.76 per cent.

Having summarized the total results in this manner, Dupuy goes to an analysis of the work done in the different parts of the Bas-Congo and of the two sub-sectors of Kwango (Bas Kwango and Bas Kwilé). In a series of tables he gives for each of the 8 sectors of the Bas-Congo the contagious index, the total endemicity, the treatment efficacy rate, and the maintained endemicity rate found during each of the last four years. The author comments upon these figures.

Writing on the subject of arsenic-resistance, Dupuy says that two forms are seen. The one is acquired early during the first course of treatment and the other is acquired slowly or is latent, and is seen in patients who have passed their lumbar puncture of control [see this *Bulletin* 1935 Vol. 32, p. 683]. The latter form is by far the more dangerous because it gives rise to contagious foci which remain unknown unless one is on the look out for them. The recognition of such a danger necessitated the re-examination of patients considered to be cured in 1931. In Ganda-Sundi where 37 new cases were discovered in 1934 among 78 000 natives, systematic examination of the old cases enabled VAN DAELE to find 9 infected persons among those declared to be cured in 1931. MARRAK and Rossi found respectively 3 cases and 12 cases belonging to the same category. The hypothesis that these old cases have been reinfected is considered and dismissed for what appear to be good reasons.

Four of the 7 foci of arsenic treatment infections discovered in 1933 still exist. In Ganda-Sundi there were 13 cases, of which 9 were latent arsenic-resistant cases. In 1933 there were 36 cases. In Tshela-Est there were 4 cases, in one of which the resistance was acquired early, the other 3 were cases considered to be cured in 1931. In 1933 there were 35 cases. In Cataractes-Nord there were 7 primary cases of arsenic-resistance and 2 latent cases as compared with 11 cases in 1933. In Bangui there were 5 primary cases and 8 cases to which the resistance was acquired early as compared with 18 cases in 1933.

Two sub-sectors still show arsenic-resistant cases. In Sankuru there were two cases in which the resistance was acquired early and in

Bas Fleuve there were 12 latent resistant infections. Arsenic resistance is no longer found in Sengololo or in Lufimi Basse Sele. The total number of resistant cases found in 1934 was 53 as against 121 in 1933. It is remarked that the evolution of the disease in cases of arsenic-resistance whether primary or acquired early in treatment is very severe. Of the 180 resistant cases recorded since 1931 in the archives of Tshela-Est, 78 cases are not cured but under control, 51 are still under treatment, and 51 are dead.

Dupuy then passes on to a discussion of methods of diagnosis and of treatment. The drugs favoured are moranyl and tryponarsyl. Arsenic resistant cases are given a combined treatment of one or two doses of moranyl followed by a number of massive doses of tryponarsyl and sometimes by tartar emetic. It is noted that the massive doses of tryponarsyl (up to 4.5 gm.) are only given after a previous injection of sodium hyposulphite.

The paper closes with an account of the way in which treatment is controlled by lumbar puncture. These punctures are performed for various purposes and are designated punctures for diagnosis, punctures for elimination, punctures for control etc. The purposes for which these are made are discussed in the previous year's report [this *Bulletin* 1935 Vol. 32 p. 683] and need not be mentioned again. It is recorded that no less than 33,317 lumbar punctures were made during 1934—the results obtained are analysed in tables.

IV Y

- i. HOARE (Cecil A.) Morphological and Taxonomic Studies on Mammalian Trypanosomes. I. The Method of Reproduction in its Bearing upon Classification, with Special Reference to the Leishman Group—*Parasitology* 1936 Jan. Vol. 29 No. 1 pp. 98-109 With 1 fig. [18 refs.]
- ii. — Morphological and Taxonomic Studies on Mammalian Trypanosomes. II. *Trypanosoma simiae* and Acute Porcine Trypanosomiasis in Tropical Africa.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1936 Apr. 8 Vol. 29 No. 6 pp. 619-645 With 1 map & 2 figs. [43 refs.]

i. This paper is devoted to a critical analysis and revision of the systematics of the mammalian trypanosomes. The fact that the classification of trypanosomes has always been controversial is due mainly to lack of agreement in the choice of criteria for the identification and differentiation of the vast number of the parasites which are at present known—they are distributed among a multiplicity of hosts and although they differ but slightly in morphology they vary considerably in their effect upon their hosts.

Practically all the known trypanosomes are referred to the genus *Trypanosoma* Gruby 1843 with the exception of one constituting the genus *Endotrypanum* Meissil and Brimont 1908 and one or two others placed in the genus *Schizotrypanum* Chagas 1909. Nothing can be said at present regarding the position of *Endotrypanum* which is a genus *en quirendum* its sole representative *E. schaudinni* requiring further investigation.

The position of *Schizotrypanum* is considered in great detail and the author reaches the conclusion that there is no doubt that both *T. cruzi* and *S. pipistrelli* belong to the Leishman group of the genus *Trypanosoma* as defined in the system of HOARE & COUTELEN (1939) with additional

DUPUY. La maladie du sommeil dans les régions scories à l'acte du fonds Reine Elisabeth pour l'assistance médicale aux indigènes du Congo Belge. [Sleeping Sickness in the Regions Infested with the Queen Elizabeth Funds for the Medical Assistance of the Indigenes of the Belgian Congo.]—*Ann. Soc. Belge de M.H.* Trop. 1934 Mar 31 Vol. 16. No. 1 pp 47-82.

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The number of old cases on 31st December 1933 was 12,886, and of these 2,041 were put on treatment—in all 19,703 patients were treated during the year. The total endemic index was 2.55 per cent, as compared with 1.86 per cent in 1933. The number of provisionally cured patients was 12,973 and the efficacy rate was accordingly 65.8 per cent. A number (469) of patients disappeared during treatment, 370 died and 5,889 patients remained on treatment at the end of the year—the maintained endemic index thus being 0.78 per cent.

Having summarized the total results in this manner, Dupuy goes to an analysis of the work done in the different parts of the Bas-Congo and of the two sub-sectors of Kwango (Bas-Kwango and Bas-Kwilu). In a series of tables he gives for each of the 8 sectors of the Bas-Congo the contagious index, the total endemicity, the treatment efficacy rate, and the maintained endemicity rate found during each of the last four years. The author comments upon these figures.

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Two sub-sectors still show arsenic-resistant cases. In Côte-Baïga there were two cases in which the resistance was acquired early and in

ii. This paper deals with the aetiology of an acute form of trypanosomiasis among pigs in tropical Africa. Study of the parasites from a number of cases showed that they all represent a polymorphic trypanosome of the same type, e.g. *T. simiae* Bruce et al. 1912. The following revised description of the parasite is given —

Nomenclature

Trypanosoma simiae Bruce et al. 1912.

Synonyms *T. ignatum* Kinghorn and Yorke 1912.

Duttonella simiae (Chalmers 1918)

T. rodhaini Walcavera 1924

T. porci Schwetz 1932

[*T. congolense portii*] Schwetz 1934

T. suis Ochmann 1905 Mayer 1912.

Morphology in Vertebrate Host — Polymorphic trypanosome comprising (1) elongated stout forms with well-developed undulating membrane (ca. 90 per cent.) (2) elongated slender forms with slight undulating membrane (ca. 7 per cent.) and (3) short (congoense like) forms (ca. 3 per cent.). The great majority of trypanosomes have no free flagellum (it is probably present in 1.2 to 3.9 per cent. only in elongated forms). Kinetonucleus typically subterminal and marginal. Dimensions total length (body + flagellum) from 12μ to 24μ , mean length from 17μ to 18μ . Binary fission markedly asymmetrical ('stepped') (Note characteristic head-to-tail agglutination in pairs).

Biological characteristics — Intermediate hosts tsetse flies (*Glossina morsitans* and possibly other spp.) development in intestine and proboscis (metacyclic trypanosomes). Pathogenicity highly virulent to pigs and sometimes to monkeys slightly virulent to goats and sheep not infective to cattle antelope dogs and laboratory rodents.

Habitat — Vertebrate hosts warthog (*Phacochoerus aethiopicus*) (reservoir) and domestic pig (*Sus scrofa*) (Suidae).

Geographical distribution Tropical Africa mainly Central and Eastern.

It is shown that *T. simiae* has affinities both with members of the *congoense* group and with those of the *brucei* group and that it occupies an intermediate position. An account is given of all the known instances of acute pig trypanosomiasis.

W Y

CORSON (J F) A Note on Hyrax and Dikdiks (*Rhynchotragus*) from Areas inhabited by Tsetse Flies. — *Jl Trop Med & Hyg* 1936 June 15 Vol. 39 No. 12 p 138

Hyrax and dikdiks obtained from tsetse free districts are known to be very susceptible to infection with *T. rhodesiense* yet they are plentiful in places where tsetse are fairly numerous and also in sleeping sickness areas. The question arises whether these animals have acquired some resistance to infection or whether their existence in fly country depends on less exposure to infection than there seems to be.

During August 1934 42 Hyrax were caught in an area where *G. steynneri* was plentiful and trypanosomiasis among stock was troublesome but sleeping sickness unknown. They were taken to Tinde and thick blood films were made and a white rat inoculated from each. Then in most cases the Hyrax was inoculated with the blood of a rat infected with *T. rhodesiense*. None of the blood films showed trypanosomes and none of the inoculated rats became infected. All the 29 Hyrax which lived long enough became infected. The cerebro-spinal fluid of some of them showed a large number of white cells and trypanosomes were seen in two cases.

In March and April 1938 42 more Hyrax were caught in the vicinity of a sleeping sickness settlement at Uyogo in the Kahaia district, where *G. morsitans* was plentiful. These animals were examined and treated in exactly the same way as the previous batch, and the results were exactly the same.

The experiments on the dikdikos were similar but on a much smaller scale only 6 animals being used. The general conclusion is that Hyrax are probably less exposed to the bites of tsetse than casual observations of their habits would suggest.

W. Y.

ADAMS (A. R. D.) Trypanosomiasis of Stock in Mauritius. II—Observations on the Incidence and Distribution of Trypanosomes in Cattle.—*Ann. Trop. Med. & Parasit.* 1935 Dec. 18, Vol. 29, No. 4, pp. 475–481. With 1 map.

In 1935 the author drew attention to the fact that in addition to classical surra there existed in Mauritius a second trypanosomal disease of stock due to *T. evansi*. Since this discovery particular attention has been paid to the specific diagnosis of all trypanosomes found in domestic stock and the present paper records the findings during the past year in respect of the incidence and distribution of these parasites in cattle.

Single blood films were then taken from the ears of local cattle selected at random from the indigenous bovine population. During the period May 1 to July 31 1935 some 2,170 cattle were examined in this way. Of these 2·03 per cent. were found to be infected with *T. evansi* and 0·74 per cent with *T. congoense*. *T. vivax* was also recovered from several beasts. During the survey several species of filariae were observed. *Babesia microti* and *B. bigemina* were also seen and in a single case *Sarcocystis sarcocystis* was found in a flea.

Reasons are given for believing that the figure obtained for the incidence of *T. evansi* must be very much inferior to the true figure. *T. evansi* retires from the peripheral blood of cattle for weeks or months, to reappear for a few days, and again to disappear for prolonged periods.

The places in which cattle and equines infected with *T. evansi* and *T. congoense* were found are shown in a map. At first sight it would appear that while *T. congoense* has been found relatively evenly distributed throughout the island, *T. evansi* is absent from the eastern side and the south western portion of the colony. This apparent difference in the distributions of the two parasites is explicable on two grounds. The high road with good surface roughly follows the main railway line and along it are situated the chief residential districts. The veterinary inspectors travelled on duty by rail, motor bus or cycle, and consequently it was found that, as was to be expected, the areas covered by them were chiefly in close proximity to the available means of rapid transport. The more inaccessible estates and villages were rarely visited. The other reason is that *T. evansi* infection in cattle did not cause the same severe and sudden disability as *T. congoense* and consequently was not reported from all parts of the country as was the latter infection.

From a study of available data, and of the incidence and distribution of *T. evansi* at the present day the conclusion is reached that this trypanosome may have been present in the Colony for many years. It is possible that it was present before surra was introduced in 1901.

W. Y.

SYMES (C B) Outline of Work on *G. palpalis* in Kenya—East African Med Jl 1935 Dec Vol. 12. No 9 pp 263-281 With 1 map. [17 refs.]

After giving a brief account of the history of sleeping sickness in Kenya the author passes to a consideration of the present position. A map is given indicating the present distribution of tsetse fly. Many square miles of these fly infested areas remain unoccupied by human beings. Very large areas of fertile shore and river lands lie derelict the descendants of previous occupants of these lands maintain a miserable existence behind belts of tsetse infested bush or mosquito-producing papyrus swamps. The lake which should be the life and soul of all native communities within many miles of its shores, is inaccessible to the majority and a menace to the few more reckless spirits who do make use of it. The control of *G. palpalis* is therefore, essential for the greatest of economic reasons and whilst tsetse and infection both exist there is also the risk of more epidemics.

The next portion of the paper is concerned with the habits of *G. palpalis* in Kenya which Symes says appear to differ in some ways from those of *G. palpalis* of the text books. Its breeding habits are particularly unorthodox. In Kenya very few typical breeding areas (e.g. the base of rocks and trees and under fallen logs) were found. Pupae occurred almost everywhere in the bush along the lake shore and river. They were discovered in relatively large numbers under a thick layer of fig leaves, with nothing but the branches of the fig tree 15 feet above the ground.

The general conclusion from this work was that it seemed impracticable to eradicate *G. palpalis* in such areas by abolishing its breeding grounds unless by this is meant practically all the bush. Trapping experiments are being continued in three areas. Scents made from the glands of certain animals improve trapping results. It was found that *G. brevipalpis* was present in the *palpalis* bush in greater numbers than had been supposed.

The paper closes with an outline of the field trials of the "block method" of attack on *G. palpalis* which is being financed by the Colonial Development Fund.

W X

Coussov (J F) Experimental Transmission of *Trypanosoma rhodesiense* by *Glossina morsitans* from Man to Sheep and Back to Man—Jl Trop Med & Hyg 1939. June 1 Vol. 39 No 11 pp 125-126.

An account is given of a very interesting experiment in which *T. rhodesiense* was passed from man to a sheep by means of *G. morsitans* and then after having been transmitted through a series of six sheep by means of *G. morsitans* for a period of over a year was passed back again to man. The scheme of transmission was as follows—Patient (21.10.34) fly-sheep (11.12.34)-fly-sheep-fly-sheep-fly-sheep-fly-sheep (90.12.35) fly-man (2.3.36).

A fly infected on the sixth sheep was fed on the author's arm on 2nd March. On 5th March seven rats were inoculated with the author's blood, but none became infected. Fever appeared on the 8th March, and although no trypanosomes could be found on microscopic examination of the blood six more rats were inoculated and all became infected. Trypanosomes were found in films of the author's blood the

following day. A reaction occurred at the place of the bite on 7th March, the fifth day after the bite and rapidly developed into a well-marked area of erythema about 2 inches across, with a darker slightly swollen and tender centre. It gradually faded and had disappeared by 17th March.

Corson considers that the local skin reaction is a useful indication of infection in persons with light skins. Its intensity depends upon the number of trypanosomes injected. In one case when a momentary bite of a known infective fly on the finger tip caused infection in 25 days no local reaction was seen.

This experiment supports the general opinion recently confirmed by Duke [see below p. 657] that attacks of Rhodesian sleeping sickness treated with Bayer 205 confer no lasting immunity. This is Corson's fourth infection within 10 years the last one being on 1st November 1934 and 5 gm. of Bayer 205 were given between 1st November and 16th November 1934. II F

DUKE (H. Lyndhurst) On the Power of *Glossina morsitans* and *Glossina palpalis* to transmit the Trypanosomes of the Bruce Group.—*Ann. Trop. Med. & Parasit.* 1936. Apr. 8. Vol. 31. No. 1. pp. 37-38.

In a previous paper [this *Bulletin* 1934 Vol. 31 p. 564] Duke reached the conclusion that *G. morsitans* is a more efficient vector of trypanosomes of the polymorphic group than is *G. palpalis*.

Owing to the fact that during the last year further supplies of *G. morsitans* pupae had been obtained from Tanganyika, it has been possible to extend work on these lines.

The infecting animals were monkeys, each infected with one of several strains of *T. gambiensis* and *T. rhodesiense* all of which were known to be transmissible by tsetse. Flies dying before the 10th day after the first feed were disregarded. Of 2,691 *G. morsitans* dissected 80 (3.83 per cent.) contained flagellates, whilst of 2,854 *G. palpalis* dissected 70 (2.45 per cent.) contained flagellates.

This additional evidence confirms the conclusion drawn from the earlier investigations, viz. that *G. morsitans* is better able to transmit trypanosomes of the brucei group than is *G. palpalis*. II F

VAN DEN BRANDEN (F.) Nouvelle contribution à l'étude de la transmission héréditaire du trypanosome. [New Contribution to the Study of the Hereditary Transmission of Trypanosoma].—In: *Soc Belges de Méd. Trop.* 1935 Dec. 31 Vol. 15 No. 4 p. 55.

A white rat infected with *T. brucei* gave birth to four young rats. Microscopic examination of the blood of the young rats did not reveal trypanosomes, but inoculation of their blood into a healthy rat caused infection. The author claims that he has thus demonstrated experimentally the hereditary transmission of *T. brucei* in the white rat. II F

DUKE (H. Lyndhurst) & MELLARSTY (Kenneth) A Note on the Infectivity of *Trypanosoma rhodesiense* in the Crop of *Glossina palpalis*.—*Ann. Trop. Med. & Parasit.* 1936. Apr. 8. Vol. 30 No. 1. p. 38.

Many years ago ROMERSON [this *Bulletin* 1913 Vol. 2, p. 247] in a paper on the development of *T. gambiensis* in *G. palpalis*, drew attention

to the fact that in some cases blood may be retained in the crop of the fly unmixed and apparently unaltered for 10 days or more although frequent feeds have intervened.

As similar observations have from time to time been made by Duke it was decided to find out whether the trypanosomes in the crop were infective on inoculation into sensitive animals. The results of three experiments of this sort were negative and it is concluded that the brief sojourn in the fly at about 24°C suffices to cause the trypanosomes to lose their infectivity

W Y

ROUBAUD (E) & COLAS-BELCOEUR (J) Essai de transmission de *Tryp. gambiensis* par *G. palpalis* à l'Institut Pasteur de Paris.
[Attempt to transmit *T. gambiensis* by *G. palpalis* at the Institute Pasteur, Paris.]—*Bull Soc Path Exot* 1936 May 18 Vol 29 No 5 pp 500-504 With 1 fig

The flies used in this experiment were hatched from pupae sent from Entebbe. In all 100 flies were fed on the 3rd, 4th and 6th of January 1936 on a guineapig infected with *T. gambiensis* the strain was isolated in 1934 from a case of sleeping sickness in the Cameroons. The flies were kept at about 28°C. by day and at about 35°C. by night and the atmosphere was kept moist by dishes of water. After the infecting meals the flies were fed on a series of guineapigs up to 28th February. None of the guineapigs became infected.

The mortality among the flies was not excessive and the authors state that it was possible to keep a large number alive beyond the period necessary for the complete development of the trypanosome in the fly. All flies living 10 days or more after the infecting meals were dissected of the 51 so examined only one was found to be infected. The trypanosomes were limited to the gut and proventriculus. A description is given of the types of trypanosomes found they correspond to those previously described and figured by BRUCE ROBERTSON and others.

W Y

LLOYD (H. M.) Notes on the Bionomics of *Glossina steynneri* Austen.—*Bull Entom Res* 1935 Dec. Vol. 26 Pt. 4 pp. 439-468. With 5 figs [10 refs.]

The observations and experiments upon which this paper is based were made in Shinyanga Tanganyika Territory from December 1930 to July 1932. Their subject *G. steynneri* an important vector of both human and animal trypanosomiasis was prior to the commencement of reclamation rapidly extending its area in the Shinyanga district and forcing the native inhabitants to retire.

A description is given of the four main types of vegetation communities infested by this fly round Shinyanga in each type game in moderate amount and therefore food is present throughout the year. While most common in hard pan (valleys where the surface soil lies just above beds of an impervious limey concrete or pseudo-laterite rock) *G. steynneri* is much less abundant in country in which the dominant tree is *Commiphora fischeri* scarce in open acacia savannah and of still less frequent occurrence in open plains. This species of tsetse breeds mainly in thickets, but its pupae are also found under decumbent logs overhanging rocks and in hollows at the bases of trees. As regards seasonal prevalence *G. steynneri* is commonest during

the first month or two of the dry season," becomes less numerous with the advance of the latter and sinks to its lowest level during the short rains. An increase occurs in the short dry season (in January or February) following the short rains, and thenceforward, throughout the long rains numbers show little alteration. Owing to the presence of game "concentrations remain in the hard pan areas throughout the dry season.

Experiments showed that a clearing 800 yards wide is not an absolute barrier to *G. steynneri* which, like *G. morsitans* "appears to find food by sight rather than by scent." Flies that cross such a clearing are mostly hungry and it is believed they are searching for food. The hungrier the fly the more persistently does it follow man, and in this respect males exhibit more pertinacity than females. Catching *G. steynneri* by hand from screens, in a block of country some 15 square miles in extent during a period of sixteen months, reduced its numbers but did not exterminate the fly. The failure of the experiment in the latter respect is ascribed by the author to the insufficient width of the isolating clearings, and also to the fact that female flies show themselves to catchers less frequently than males, "so that breeding is able to continue." In the first months of the experiment the catch was predominantly male subsequently A very large rise in female percentage occurred." E E deacon.

- i. LAMBORE (W. A.) & HOWAT (C. H.). A Possible Reservoir Host of *Trypanosoma rhodni*—*Brit. Med. Jl.* 1935, June 6 pp. 1153-1155.
ii. DAVY (J. B.). Trypanosomiasis. (Correspondence).—*Med. Jnl.* June 2 pp. 1321-1322.

i. Details are given of a Nyasaland native infected with *T. rhodni*, but showing no signs of the disease.

The patient was admitted to hospital at Fort Johnston on 18th June 1935 suffering from urinary schistosomiasis and ankylostomiasis. On examination of his blood polymorphic trypanosomes (*T. rhodni*) were found. The native has been kept under observation for over 6 months, and apart from an improvement in his general health as a result of treatment of the hookworm and bilharzia the condition remains unchanged. Except for rises of temperature on two occasions the course has been afebrile he is content to remain in hospital and weaves mats, the intricate nature of this work indicating that his muscular co-ordination is unimpaired.

The blood has been examined at weekly intervals and the number of trypanosomes found per 100 leucocytes is given in a chart. Once every month the condition of the cerebrospinal fluid and of the lymph has been investigated, but without pathological findings. The trypanosome was transmitted to dogs and rats by the syringe and by the fly. It produced in these animals an acute disease.

The authors state that it is apparent that this patient is either passing through a latent stage in the course of active trypanosomiasis or else that he is a carrier of the disease. Since the patient has so long remained able-bodied, and since he resides in an area infected with *G. morsitans* it is evident that any flies which might have bitten him could well have passed on the infection to others, and that in this way could have been started an epidemic comparable to those which have been traceable to one infected person. The history of the first outbreak

of sleeping sickness in Nyasaland is particularly instructive in this respect, and is referred to in some detail.

From the sleeping sickness diaries it appears that Dr J. B. Davey in 1908 diagnosed the first case of sleeping sickness found in the Protectorate in a native at Nkata Bay who had accompanied a European to Tanganyika and the Congo. The native returned to Nyasaland from Cape Town by steamer. Davey records that the patient was in good health, the glands were not greatly enlarged and examinations of the blood were negative and that the native had been back in his village in a fly free area, for one year during which time he had made no complaint of ill health.

The patient was removed and segregated near Dowa about 130 miles south. His removal in a condition comparable to that of the native who is the subject of the present communication and the want of proper care to shield him from fly appears to have been responsible for the epidemic of sleeping sickness which followed in the Dowa district.

The conclusions are as follows —

This case may well afford an affirmative answer to the question Can *T. brucei* occurring in areas where human trypanosomiasis is unknown infect man? Its importance lies in the fact that the spread of sleeping sickness is in all probability mainly due to the movements of human carriers of a strain of trypanosome which, while not immediately pathogenic may become so after more than one passage through man.

"It emphasizes the need for examination of the whole population when sleeping sickness arises apparently *de novo*. The investigation should include the examination of the blood of even the apparently healthy and of material obtained by puncture of the lymph glands.

Dr. Davey referring to Lamborn and Howat's paper states that if as these authors believe the trypanosome on first transfer to man from game, i.e. the fly establishes itself in its new host with difficulty and even then is only mildly pathogenic we have an explanation of the escape from infection of large numbers of persons bitten by infected flies. There still, however, seems to be a hiatus between the discovery of a carrier by Lamborn and Howat and the usual acute course of infection. Surely one passage through man does not so intensify the pathogenicity of *T. brucei* to man that it becomes capable of causing death in 100 per cent. of untreated cases within 4 months. Davey suggests that this hiatus does not in fact exist. He refers to two cases reported by the Medical Officer in charge of sleeping sickness investigations, 1917 which long survived the usual 4 months duration of the disease. There are indeed good grounds for believing that one of them actually recovered and the other showed no signs of disease 8½ months after a diagnosis had been made. Davey agrees with Lamborn and Howat that the human carrier is the danger. If infection of man may arise in any area where *G. morsitans* and game harbouring *T. brucei* exist as recent knowledge of the disease suggests Davey enquires whether the time is not ripe for reconsidering the conclusions to which the Royal Society's Commission to Nyasaland came. One of these reads

It is self-evident that these wild animals should not be allowed to live in fly-country where they constitute a standing danger to the native inhabitants and the domestic animals. It would be as reasonable to allow mad dogs to live and be protected by law in our English towns and villages. Not only should all game laws restricting their destruction in fly-country be removed but active measures should be taken for their early and complete blotting out.

Sicet (A) ROBIX (Ch.) & MERCIER (H). Forme évolutive atténuée de la trypanosomiase humaine ses rapports avec un trypanosome de moindre virulence. [Attenuated Form of Human Trypanosomiasis its Relationship with a Trypanosome of Slight Virulence.]—*Marseille Méd.* 1936 Mar 15 Vol. 73. No. 8. pp. 345-351. With 1 fig.

The authors have studied the morphology of a trypanosome isolated from a very chronic case of human trypanosomiasis.

The history of the patient is given in considerable detail. He left the Ivory Coast for France in July 1934 apparently in a state of perfect health, and remained well until April 1935 when he was admitted to hospital with pain in the legs, a bilateral oedema, general adenitis and tachycardia. Trypanosomes were found on gland puncture. Lumbar puncture showed slight alterations in the spinal fluid, the cells being 24 per cmm. and the protein 0.30 per 1,000.

After some difficulty a guinea-pig was infected with the trypanosome, and then the strain was transmitted through a series of guinea-pigs. Attempts to infect mice failed. The authors remark upon the long incubation period, the prolonged infection and the absence of abortion in the infected guinea-pigs. They state that by observing daily the evolution of the trypanosomes in the infected animals they have been able to follow the adaptation of the parasite for the organism of the guinea-pig.

The trypanosome at the beginning was remarkably polymorphic and it still retains the character but to a less degree. The multiplication of the trypanosome did not appear to the author to be particularly active, but it exhibited interesting characters. Some forms were noted in which the nucleus had divided and one nucleus was near the undivided blepharoplast and the other at the junction of the middle and posterior thirds of the body.

The authors write that the trypanosome in the course of its adaptation to the guinea-pig presented most of the various characters exhibited by *T. rhodesiensis* e.g. marked polymorphism and posterior-anterior forms. These points are illustrated in a text-figure. The patient, however suffered from a chronic disease and came from a region, the Ivory Coast where Rhodesian sleeping sickness is unknown. ^{W.F.}

MOUSTARDIER (G.). A propos d'un cas de méningo-encéphalite trypanosomique chez un Sénégalais à Tananarive. [A Case of Trypanosomal Meningo-Encephalitis in a Senegalese at Antananarivo.]—*Bull. Soc. Path. Exot.* 1936. Apr 1 Vol. 29 No. 4 pp. 435-442.

The patient was a native of the Ivory Coast who enlisted for 4 years in February 1929. He served for 3 years in Senegal and was repatriated eventually to the Ivory Coast. In February 1933 he re-enlisted for a further period of 4 years and left Africa on August 31 1933 for France whence he was sent to Madagascar where he arrived on October 21, 1933. The patient was admitted to hospital at Antananarivo owing to an epileptiform attack in August, 1935. The findings and subsequent history of the case are given in great detail.

The case turned out to be one of trypanosomal meningo-encephalitis in an advanced stage. Spinal puncture revealed trypanosomes, leucocytopsis and an excess of globulin. The date of infection is

unknown, but it could not be later than August 1933 when he left West Africa for France. The disease advanced insidiously for two years without producing general symptoms—there were no febrile disturbances, no emaciation and no somnolence.

W Y

VAN BOGAERT (Ludo) Présence de lésions myéliniques dans la trypanosomiase expérimentale [Presence of Myelin Lesions in Experimental Trypanosomiasis].—*C R Soc Biol* 1936 Vol 121 No 13 p 1387

In a previous paper the author with BORREMANS drew attention to the occurrence in a case of human trypanosomiasis of a cystic degeneration of the subthalamic region and in the neighbourhood of the third ventricle. There was a micro-poly-cystic degeneration of the parenchyma involving the myelin fibres.

More recently the author has had the opportunity of examining the brain of a baboon (*Papio jubatus*) infected experimentally with *T. gambiense*. He found definite involvement of the myelin of the centrum ovale and of the claustrum by foci irregularly distributed round the vessels. In addition to these juxta-vascular foci there was a marked demyelination of the corona radiata and particularly of the fibres which go to the corpus callosum. The myelin lesions were old, and the demyelinated areas were the seat of very manifest macro- and microglial proliferation. The myelin lesions were accompanied by very gross lesions of the axone.

W Y

BOUVIER (G.) Le diagnostic microscopique des trypanosomiases bovines en brousse [Microscopic Diagnosis of Trypanosomiasis in Cattle in the Bush].—*Bull Agric Congo Belge* 1936 Mar Vol 27 No 1 pp 65-69

This paper describes the various methods of examining the blood of cattle for trypanosomes and contains nothing new.

W Y

DUKE (H. Lyndhurst) On the Prophylactic Action of Bayer 205 against the Trypanosomes of Man. Concluding Observations.—*Lancet* 1936 Feb 29 pp 463-469 [12 refs.]

In this paper the author concludes his observations on the prophylactic action of Bayer 205 against human trypanosomiasis [this Bulletin 1935 Vol 32, p 8].

Referring to his former paper Duke writes that the use for the first time of native volunteers on a large scale involved difficulties that have since been largely overcome and explained the inclusion in his first paper of the men of Group I i.e. infected cases treated with Bayer 205. There were of course objections to their employment, i.e. the large amount of Bayer administered and the possible immunizing effect of the liberation of antigen following the destruction of trypanosomes by the first dose. The full extent of the protection conferred by the drug against *T. rhodesiense* was not determined as no protective volunteers succumbed to that trypanosome.

In the course of the present investigations several of the volunteers after having been infected and treated were later on again exposed to infection. Details of this work are given in a table from which it appears that any immunity conferred by a brief (10 to 15 days) infection

with *T. rhodesiense* or *T. gambiense* followed by a course of six injections with Bayer 205 or trypanasamide does not persist for as long as 6 to 16 months.

In the second table information is given regarding the observations made on 18 further volunteers. Nine received a single dose of 1 gm. of Bayer 205, five a single dose of 2 gm., and the other four 2 doses of 1 gm., separated by an interval of 21 days. All the injections were given intravenously. Of the nine who received 1 gm. of the drug four were infected at their first exposure, viz., 92, 105, 92 and 73 days, respectively, after the administration of the drug. Two of the infections were *T. gambiense* and two *T. rhodesiense*. The remaining five were protected for 120, 123, 87, 190 and 327 days respectively. Of the volunteers receiving 1 gm. + 1 gm. of Bayer 205 none were infected at their first exposure. Protection against *T. gambiense* lasted 169 and 187 days, and against *T. rhodesiense* 171, 206 and 164 days. Now of those receiving 2 gm. of the drug were infected at their first exposure, and protection against *T. gambiense* lasted 128 and 153 days, and against *T. rhodesiense* 163, 103, 152, 180 and 179 days.

As a general rule when infection did ensue it developed normally. There were, however, certainly three and possibly five examples of delayed or "cryptic" infection, when the patient showed no apparent symptoms for two months and possibly longer. An infection of this kind may gradually generate typical symptoms or it may become merged into a subsequent infection superimposed upon it and running a normal course.

The matter is discussed in considerable detail and Duke reaches the conclusion that "cryptic" infection may arise independently in nature, apart altogether from the administration of any drug.

Consideration of one of the cases suggests that frequently repeated inoculations of living trypanosomes during the three or four months immediately following the administration of Bayer 205 lead to the establishment of a more prolonged immunity than that conferred by the drug alone without such frequent exposures to infection. Duke writes that if this be true then the more intense the exposure in nature to infective tsetse the greater the benefit derived from the prophylactic.

The general conclusion is that a dose of 2 gms. of Bayer 205 administered to an adult may be expected to confer protection against *T. gambiense* and *T. rhodesiense* for at least three months and the protection may last longer.

W. F.

VICARS-HARRIS (A. H.) The Occupation of Land reclaimed from the Tsetse Fly of Tanganyika.—*East African Ann. 1934-35* Nairobi, 6 pp. With 10 figs. [Summarized in *Rev. Applied Entom.* Ser. B 1938, May Vol. 24 Pt. 5, pp. 103-104.]

A brief account is given of the land that has been reclaimed from *Glossina* in Tanganyika Territory particularly in the Shinyanga district, and of the means adopted to induce permanent settlement by natives. Between 1923 and 1931 some 140 square miles of country had been reclaimed by the natives in Shinyanga under the guidance of the Government. Between 1927 and 1932 some 80 square miles were reclaimed in Mwanza Province, and a smaller area in Ngora was cleared and closely settled. In the Mbala District in the Northern Province, over 200 square miles was made available in 1931 by cutting corridors and throwing open hitherto inaccessible plains. A rather more

detailed account is given of the opening up of the Huruhuru plains for grazing and settlement. Unfortunately the corridor 1,200 yards wide leading to these plains was found to be too narrow for safety as small numbers of flies were observed wandering into it and along the cattle track. Ultimately it is hoped to render free from fly an area three or four miles wide but in the meantime cattle were successfully taken through by sending trained native assistants with catching screens ahead of each herd. Not many flies were caught. An area of 150 square miles has been opened up and the sojourn of cattle in it during the first season has been a great success.

YORKE (Warrington) & MURGATROYD (F) in collaboration with F GLYN HUGHES H M O LESTER & A O F ROSS A New Arsenical for the Treatment of Syphilis and Trypanosomiasis.—
Brit Med J 1936 May 23 pp 1042-1048.

During the last seven or eight years the authors have examined for the Chemotherapy Committee of the Medical Research Council the trypanocidal activity of numerous new compounds including a long series of aromatic arsenicals of the general formula—



prepared in Professor MORGAN's Laboratory of the Department of Scientific and Industrial Research at Teddington. The initial steps in this investigation consisted in examining the trypanocidal activity of the compounds first in mice and later in rabbits infected with a standard trypanosomal infection, the response of which to old and well tried drugs such as atoxyl and tryparsamide had been thoroughly investigated.

About half a dozen of these new compounds were found to have a therapeutic activity in trypanosome-infected mice at least equal to that of tryparsamide. One of the most active of these Neocryl was selected for more extensive trial on larger animals and eventually on man. This product which is to be put on the market as Crylaran Brand of Neocryl is sodium succinilornethylamide-p-arsonate. It is a white crystalline substance readily soluble in water.

The drug was tried on a considerable number of patients suffering from various stages of syphilis and on a limited number of cases of Nigerian sleeping sickness. The portion of the paper relating to the trials on syphilis has been summarized in the *Bulletin of Hygiene* (1936 Vol. 11 p 693) and does not require further notice here. The trials on Nigerian sleeping sickness were carried out by Dr Lester Deputy Director of the Tsetse Investigation in Nigeria. The results obtained are summarized in the following table—

It is stated that the stimulant action of a long course of treatment with the drug was very pronounced and led to the same difficulty commonly met with in experimental work with tryparsamide. Patients felt so much better that they became tired of the prolonged treatment and absconded before they had completed their course of injections. Of the first eight cases treated with neocryl five disappeared before the final examination of the cerebro-spinal fluid could be made. In every case patients showed very rapid clinical improvement and thought themselves completely cured after they had had five or six injections.

TABLE IV.—Summary of Results Obtained in the Treatment of Cases of Nigerian Sleeping Sickness with a Single Course of Naegleria

Case No.	Age	Sex	Condition at Commencement of Treatment		Treatment	Condition Immediately after Treatment		Remarks
			Critical	Critical		Critical	Critical	
4482	6 months	M.	Wretched, severe headache of the occipital and right temporal regions, slight drowsiness, dry skin.	+	Normal	21/8/34 to 16/9/34	22/8/34 to (3 green doses)	Alone treated 12/8/34
4483	1	M.	Wretched, headache long and strong, drowsiness, dry skin.	++	Normal	21/8/34 to 16/9/34	22/8/34 to (3 green doses)	Alone treated 13/8/34
4484	1 year	M.	Wretched, very severe headache of the occipital and left temporal regions, slight drowsiness, dry skin.	+	Normal	21/8/34 to 16/9/34	22/8/34 to (3 green doses)	Alone treated 14/8/34
4485	4 months	M.	Wretched, severe headache of the occipital and left temporal regions, slight drowsiness, dry skin.	+	Normal	21/8/34 to 16/9/34	22/8/34 to (3 green doses)	Alone treated 15/8/34
4486	1 month	M.	Wretched, severe headache of the occipital and left temporal regions, slight drowsiness, dry skin.	+	Normal	21/8/34 to 16/9/34	22/8/34 to (3 green doses)	Alone treated 16/8/34
A.O.	6 months	M.	Wretched, severe headache of the occipital and left temporal regions, slight drowsiness, dry skin.	+	Normal	21/8/34 to 16/9/34	22/8/34 to (3 green doses)	Alone treated 17/8/34
M.D.	+	M.	Wretched, severe headache of the occipital and left temporal regions, slight drowsiness, dry skin.	-	Normal	21/8/34 to 16/9/34	22/8/34 to (3 green doses)	Alone treated 18/8/34
K.O.	4	M.	Wretched, severe headache of the occipital and left temporal regions, slight drowsiness, dry skin.	-	Normal	21/8/34 to 16/9/34	22/8/34 to (3 green doses)	Alone treated 19/8/34
S.J.	+	M.	Wretched, severe headache of the occipital and left temporal regions, slight drowsiness, dry skin.	-	Normal	21/8/34 to 16/9/34	22/8/34 to (3 green doses)	Alone treated 20/8/34

Taken as a whole the results were distinctly promising. No late cases were included in the series but it is noteworthy that one very advanced case that had failed to react to full courses of tryparsamide of Bayer 205 and of antrypol, for some reason or another improved markedly on being given a course of this new drug.

11 }

KELLERSBERGER (E. R.) African Sleeping Sickness a Clinical Study
—*Southern Med Jl* 1936 Mar Vol 29 No 3 pp 239-242 With 3 figs.

This paper gives an interesting summary of the author's work on the treatment of sleeping sickness at Bibanga in the Katanga Province of the Belgian Congo.

Since 1924 when the present small hospital was completed over 40 000 patients have been seen and about 11 000 (28 per cent.) of these had sleeping sickness. It is noted that most of the patients presented themselves voluntarily and that about 75 per cent were observed for two years or more and some for as long as 5 or 10 years. The greatest number of cases discovered was 2,915 in the year 1927.

The patients were divided roughly into three groups. The first group comprises those in apparent good health with trypanosomes in the peripheral blood with irregular fever and persistent headaches and inability to do full work. The second group comprises cases which present definite clinical signs such as adenitis, constant headaches and irregular fever, tremors, slow slurring speech, stupor and slow mental response. Gland puncture in these cases usually revealed the presence of the parasite and lumbar puncture often showed increased pressure, excessive globulin and lymphocytosis. No less than 75 per cent of the patients fell into this group. The last group comprises all advanced cases with varied symptoms such as somnolence amounting almost to coma, incoordination of movements, occasional involuntary defecation and urination, and sometimes mild or violent insanity. This group contained 13 per cent of the patients.

Atoxyl, antimony germanium and tryparsamide were the four drugs used. Kellersberger states that a number of patients were cured with atoxyl some of whom had been observed for over 7 years. The disadvantages of atoxyl are the danger of blindness, the need of prolonged treatment consisting of repeated series of injections over several years, its uselessness in advanced cases and the difficulty of persuading a native to submit to painful injections over a long period.

Antimony preparations were never used alone but always in conjunction with tryparsamide when there was concomitant schistosomiasis or when tryparsamide alone did not appear to be efficient.

Bayer 205 was extensively used over 4 000 injections being given intravenously in an average dose of 0.02 cgm (gm.?) per kilo of body weight. Short courses of 3 or 4 injections cured early cases where the trypanosomes were essentially a blood parasite. All the cases of the second or third group however relapsed after temporary improvement and then had to be treated with tryparsamide.

In the author's opinion the most useful drug for all cases is tryparsamide. Since 1924 it has been the drug of choice in the Congo and no less than 150 000 injections have been given by the native staff to 10 000 cases. To effect a cure the drug must be pressed to the limit of security. The average dose was 0.045 gm per kilo anything in excess of this may cause blindness especially in advanced cases. In

Itinerant work in the bush where it is difficult to control the patient, it is wiser to use small doses for longer periods, and consequently the itinerant personnel of the Belgian Government never exceeds a 2 gm. dose. Patients who weigh 70 kilos. or more received in the author's dispensary as much as 3 gm. or even 4 gm. per week with excellent results. It was found that a series of 15 injections weekly is preferable to the 8 or 9 given formerly and in cases where the central nervous system is involved it is wiser to repeat the cure after a rest of from one to three months depending upon the condition of the patient as judged by lumbar puncture and other examinations.

Tryparsamide as a rule cures cases of Group I, but it is in the more advanced cases that it is the most efficient of all drugs. Patients who were moribund and apparently hopelessly insane have been cured, and the results have been controlled in many cases for 6 or 7 years. Kellersberger states that he has considered as cured a patient who is in good clinical condition one year after treatment and with negative laboratory examinations. As many as 75 per cent. have been cured, and under ideal conditions it is possible to obtain an 80 or 90 per cent. cure.

W J

VAN DEX BRAKDEX (F), APPERLANS (M) & POTTIER (R). La toxicité du tryponarsyl additionné d'hyposulphite sodique pour le parenchyme rénal. [The Toxicity of Tryponarsyl with Sodium Hyposulphite for the Renal Parenchyma.]—*Ann. Soc. Belges de Méd. Trop.* 1936 Mar 31 Vol 16 No. 1 pp. 121-123

For some time it has been considered advantageous to associate sodium hyposulphite with tryponarsyl in the treatment of sleeping sickness in the Congo—the sodium hyposulphite is believed to lessen the risk of visual disturbance resulting from the arsenical.

The authors have investigated the question whether sodium hyposulphite increases the general tolerance of the rabbit to tryponarsyl, and have reached the conclusion that it does not do so. In the second part of their work they examined particularly the kidneys of rabbits which had received various doses of tryparsamide alone, and of other rabbits which had received the same doses of this arsenical and, in addition, various doses of sodium hyposulphite. The kidneys of the rabbits which had been given tryparsamide alone (up to a dose of 1.5 gm. per kilo) showed no pathological changes, whereas the kidneys of the rabbit which had been given 1.25 gm. of tryparsamide + 0.53 gm. of sodium hyposulphite per kilo, showed severe lesions. The conclusion is that sodium hyposulphite does not protect the renal epithelium from damage by tryparsamide but on the contrary may increase the risk.

W J

POTTIER (R.) & VAN DEX BRAKDEX (F). Contribution à l'étude toxicologique de la glyphenarazine (tryparsamide, tryponarsyl, novatoxyl, trypotan). [Contribution to the Study on the Toxicity of Glyphenazine (Tryparsamide, Tryponarsyl, Novatoxyl, Trypotan).]—*Ann. Soc. Belges de Méd. Trop.* 1936 Mar 31 Vol 16 No. 1 pp. 105-107

The substance of this paper has already been published elsewhere and noticed in this Bulletin [1936 Vol. 33 p. 201].

W Y

STEWART (J. L.) Treatment of Trypanosomiasis by Tartar Emetic, Antimony and Surfen C in the Gold Coast.—*Jl Comp Path & Therap* 1935 Dec. 31 Vol. 48. Pt 4 pp 316-318

A summary is given of the result of treating with antimony and a new Bayer preparation Surfen C Gold Coast cattle suffering from trypanosomiasis.

The cattle of the Gold Coast differ from those of Nigeria. The latter are humped zebras while the former belong to the West African Short horn unhumped breed which has a much higher resistance to trypanosomiasis than the zebra.

Details of the result of treating cattle belonging to both types are given. The treatment by Surfen C did not appear to be nearly as effective as that by tartar emetic and other antimony preparations but

Surfen C appeared to be useful after antimony treatment to prevent relapses. All the 85 cattle are alive except two which died from inter current infections. The zebra bullocks which relapsed are however in very bad condition but the zebra cows and heifers treated by antimony appear to have made a complete recovery and are in excellent condition one or two years after treatment.

IV Y

OESTERLIN (M.) Zur Chemotherapie der Infektionskrankheiten [On the Chemotherapy of Infectious Diseases]—*Ztschr f Hyg u Infektionskr* 1936 May 14 Vol. 118. No 3 pp 263-306
With 1 fig [66 refs.]

This long and rather technical paper must be consulted in the original by those interested. It is shown that chemotherapeutic action is dependent upon the optical activity of a substance and that both anti-podes behave very differently against trypanosomes just as the capacity to dye animal or vegetable threads by the same substances differs.

A series of mice were given 20 mgm. of casein atoxyl compound on 1st October and nine days later were infected with *T. brucei*. On the 13th October the mice were treated with various doses of atoxyl, and it was found that 0.8 mgm. sufficed to produce a permanent cure. In mice which had not received the preliminary dose of casein-atoxyl compound the maximum dose of 4.0 mgm. of atoxyl failed to produce a complete cure. This means that the effective dose of atoxyl is reduced to 20 per cent when as the result of a preliminary treatment of the experimental animal the corresponding antibody has been produced. The phenomenon is strictly specific previous administration of casein atoxyl does not reduce the curative dose of tryparsamide or spirocide.

The toxicological and direct acting factor in the metal-free derivatives of acridin and chinolin is bound up with the fluorescence of these substances. The fluorescent emissions of these substances were spectrographically absorbed and the relationship between fluorescence and activity ascertained. The activity of substances is only developed when there is a firm anchoring to the parasite cell. As a result of this firm binding the optical properties are changed the exciting radiation is turned in the visible direction and the fluorescent colour is altered. In a table the author gives details regarding the colour in neutral solution the fluorescence in neutral solution the fluorescence in solution pH 6 the fluorescence in the trypanosome in ultra violet and in white light and the trypanocidal activity in respect of 23 acridin and chinolin

derivatives. It is noted that the fluorescence seen in the trypanosomes can be approached *in vitro* by adjusting the pH.

Fluorescent substances such as rivanol, which possess no basic groups are inactive. It is suggested that in the trypanocidal saponins and chinolin the pentavalent nitrogen serves as the luoptophore group; rivanol, when changed into rivanol-methylsulphate becomes trypanocidal.

Chemotherapeutic interference is not a biological but a pure physico-chemical phenomenon due to the occupation of the trypanosome receptors by feebly or completely inactive products thus preventing the specific binding of active substances.

Experiments on interference have produced evidence that all such substances as the arsenic acids, chinolin and acridin compounds are anchored by the same constituents of the trypanosome cell. If I

SAXERAC (R.) & LARTHE (N.) Action de certains dérivés du cuivre sur le *Treponema cuniculi* et le *Trypanosoma brucei*. [The Action of Certain Derivatives of Copper on *Treponema cuniculi* and *Trypanosoma brucei*]—*C R Soc Biol* 1935 Vol. 120, No. 9 pp 1179-1181

Copper oxide and hyposulphite were tried on rabbits infected with *Trep. cuniculi*. The former which was given subcutaneously in oily suspensions produced immediate benefit, but relapse followed. The latter given intravenously gave better results and definite cure was obtained with two injections of about 14 mgm. per kilo.

Perla (1934) has shown that copper sulphate given by the mouth for 12 days protects to some extent rats against subsequent infection with *T. lestoii* or *T. equiperdum*. The authors examined the action of oil suspensions of copper protoxide in rats infected with *T. brucei*. It was found that a dose of 20 mgm. per 100 gm. sufficed to clear the circulation temporarily. A pseudo-colloidal solution of copper (electrocuprol) likewise exerted a definite temporary action, as also did copper sulphate.

If I

SCHILLING (Claus) with H. SCHRICK, H. NEUMANN & H. KREUZ
Versuche zur Schutzimpfung gegen Tsetsekrankheit III und IV
Teile [Experiments on Protective Inoculation against Tsetse Disease. Parts III and IV]—*Ztschr f Immunphys u. Exper Therap* 1936 Jan. 9 & Apr. 15 Vol. 87 Nos. 1/2 & 3/4
pp 47-71 482-518. With 19 figs. [12 refs.]

In these two lengthy papers the authors continue the account of their work on immunization against trypanosomes [this *Bulletin* 1935, Vol. 32 p. 43 and p. 714 and 1936 Vol. 33 p. 180].

The third communication deals with the antigen properties of various trypanosome species and strains. In this work the authors employed, in addition to certain old strains collected between 1911 and 1914, various strains of *T. congolense*, *T. brucei* and *T. rhodesiensis* of comparatively recent date. A list of these strains is given and information is also supplied regarding the manner in which they have been maintained. The antigenic property and the receptor (sensitivity to antibody) are two different attributes of the trypanosome cell. Experiments to illustrate the truth of this are given. From a strain of "Ferox" a serum-fast variety was obtained. Mice were infected with

the normal strain and then cured some were then inoculated with the homologous normal strain and others with the serum fast strain the former were refractory but the latter became infected. When however mice were infected with the serum-fast strain and then cured they were found to be resistant to both the normal and the fast strain This experiment shows that the serum fast strain had the same antigenic qualities as the normal strain but not the same receptors.

It was found that genuine strains of a trypanosome species obtained from several places in East Africa might behave similarly or differently in respect of their antigenic property and receptors. Such changes—loss of antigenic property or of receptors—may be produced in one of the following ways—(a) during an infection—relapse strain formation (b) as the result of previous treatment with dry trypanosomes (c) as the result of the passage of the strain through *Glossina* and (d) by the transference of a strain from one species of animal to another

When a second infection is superimposed on a first the antibodies to the first infection may disappear from the serum and antibodies to the second infection may appear. Antibodies appear in different animals at very different times after infection in the foal Lottchen they appeared on the 126th day in the foal Zeus on the 49th day and in a rabbit on the 9th day

In order to test the value of sera in respect of parasitoidal antibodies the author always used the *in vivo* mice experiment as a standard. The serum immediately after it was obtained was always heated to 45°C. for 30 minutes to kill any trypanosomes it might contain. Sufficient trypanosomes were then added so that the suspension when examined microscopically showed not more than one trypanosome to a field. 0.5 cc of this suspension was then injected intraperitoneally into mice. If the suspensions contained substantially more trypanosomes the trypanocidal action was not manifest or of 2 mice injected only one failed to become infected. Sometimes parallel *in vitro* observations were made but these did not always agree with the *in vivo* results. The authors however did not succeed in establishing that there existed any real difference between the *in vitro* antibodies and the *in vivo* antibodies

Discussing the question whether in trypanosomiasis a spontaneous sterilizing immunity ever occurs the authors give details of two cases in which it seemed probable but it is not possible to speak with certainty on this matter [This should be compared with VAN SACEGHEM's findings see below]

It was found that the parasitoidal antibodies of the serum could pass from the mother to the offspring

It is also noted that the strain of *T. brucei* Hamburg alt which in 1914 developed in *Glossina* without difficulty was no longer capable of doing so in 1933

RODOVI and Schilling (1913) showed that a trypanosome suspension kept at 37°C for some hours (which killed all the parasites) was toxic when injected into mice. In 1930 Schilling and Neumann repeated this work with the same strain of trypanosomes and failed to confirm the previous observation. It was found however that suspensions of a strain of *T. brucei* (maintained two years in mice) and kept at 37°C for 18 hours was exceedingly toxic for mice.

The fourth communication deals more generally with trypanosome infections. It is difficult to follow closely the course of an infection in the larger experimental animals. When the number of trypanosomes

derivatives. It is noted that the fluorescence seen in the trypanosomes can be approached *in vitro* by adjusting the pH.

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II F

SCHILLING (Claus) with H. SCHRECK, H. NEUMANN & H. KRÜGER. Versuche sur Schutzimpfung gegen Tsetsekrankheit. III und IV Teile. [Experiments on Protective Inoculation against Disease. Parts III and IV].—*Ztschr. f. Immunphys. u. Extratherap.* 1938. Jan. 9 & Apr. 15. Vol. 87 Nos. 1/2 & 3/4 pp. 47-71, 482-518. With 19 figs. [12 refs.]

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KLIGLER (I. J.) & BERMAN (M.) Susceptibility and Resistance to a Trypanosome Infection. X.—Specific Character of the Immunity produced in Rats by the Injection of Suspensions of Dead Trypanosomes.—*Ann Trop Med & Parasit* 1935 Dec. 18. Vol. 29 No 4 pp 457-461

In a former paper Klugler & Comaroff [this Bulletin 1935 Vol. 32, p. 715] showed that repeated injection of a suspension of dead trypanosomes into rats enhances their resistance to an infection with the homologous strain of the organism. The present work was undertaken to determine whether this acquired resistance is specific.

The general technique was the same as that described in the earlier paper. A heavy suspension of trypanosomes in saline was incubated at 37°C. for 2 hours and then left in the ice-box until all the trypanosomes were dead. This saline suspension of dead trypanosomes was used for immunization each rat received 5 injections of 1.0 cc. on 5 successive days. The infecting dose was given 3 to 5 days after the last injection. Five experiments were carried out. In two the rats were treated with *T. evansi* suspension, and then equal groups were infected with *T. evansi*, *T. gambiense* and *T. equi* respectively. In two the rats were treated with *T. gambiense* and then groups were infected with the three species. In the last experiment the rats were treated with *T. equi* before injection with the three species of trypanosomes.

The results of the experiments are summarized in tables from which it appears that rats treated with suspensions of dead trypanosomes develop an increased resistance to an infection with the homologous strain. The enhanced resistance is specific an infection with another species follows the same course as in control non-treated animals.

W Y

CORSON (J. F.) Antelopes as Reservoirs of *Trypanosoma gambiense* [Correspondence.]—*Trans Roy Soc Trop Med & Hyg* 1936 Apr 8. Vol. 29 No 8 p 690.

Referring to the well known experiments of BRUCE (1910) with *T. gambiense* and antelopes, Corson questions whether the existence of a chronic infection of the antelope with *T. brucei* was excluded. There seems little doubt that some at least of the antelopes became infected with *T. gambiense* but whether the trypanosomes which were transmitted from the antelopes several months afterwards were *T. gambiense* or *T. brucei* appears to be doubtful, as no experiments were made on human beings. The importance of the subject makes it desirable that the experiments be repeated under stricter conditions.

W }

BOURGUIGNON Contribution à l'étude des trypanosomiases des suids au Congo Belge. [The Trypanosomes of Pigs in the Belgian Congo]—*Ann Soc Belge de Mèd Trop* 1935 Dec. 31 Vol. 15. No 4 pp. 491-499

The observations upon which this paper is based were made during two virulent epidemics of trypanosomiasis in pigs the first during the beginning of 1932 near Stanleyville and the second some distance north west of Elizabethville.

The mild trypanosomiasis of pigs is mainly due to *T. congolense*. *T. brucei* is not found in pigs in nature and these animals are known to *T. vivax*. In 1921 WALRAVEN described a new species of trypanosome under the name *T. rodhaini* which causes a virulent disease of pigs in the vicinity of Elisabethville. Bourguignon comes to the conclusion that *T. rodhaini* is only a variety of *T. suis*. He then passes to a consideration of the virulent trypanosomes of pigs described by SCHWERTZ (1930) and also of those found by himself in the Province Orientale in 1932 and by himself and JOSSET at Katanga.

The general conclusion is that the chief characters of the trypanosomiasis of pigs are firstly its great virulence for the pig and the impossibility of transmission to the usual laboratory animals, and secondly a morphology which is predominantly that of *T. suis*. He points out that *T. suis* resembles *T. gambiense* in that it is made up of two extreme forms, the one without and the other with a free flagella and intermediate forms.

H.F.

QUARTERLY BULLETIN OF THE HEALTH ORGANIZATION. LEAGUE OF NATIONS. Geneva 1938. Mar Vol 5 No 1 pp. 163-181. Animal Diseases communicable to Man. C. Trypanosomiasis. Report of Committee on Diseases conveyed by Animals to Man and Resolutions of Pan African Health Conference, Johannesburg, Nov 20-30 1935 pp. 163-169] DU TOIT (P.) Trypanosomiasis of Domestic Animals. [Annex L pp. 170-171] MACLEAX Notes on Trypanosomiasis. [Annex II pp. 172-181]

These articles are of a general nature and contain nothing new

H.F.

BORGSTROM (G. C.) & VAN DEN BRACKE (L.) with the collaboration of Ludo VAN BOGAERT La trypanosomiasis expérimentale du cynocéphale par voie intrarachidienne. [Experimental Trypanosomiasis of the Baboon after Intrathecal Inoculation.]—Int. Sc. Belge de Med. Trop. 1938 Mar 31 Vol 16 No 1 pp. 9-17 With 12 figs. on 6 plates.

Information is given of attempts to infect *Papio ursinus* intrathecally with *T. brucei* and *T. gambiense*.

Five animals were given 2 or 3 lumbar injections of the blood of guineapigs heavily infected with a strain of *T. brucei* which had been passed through 40 guineapigs, and six animals received 2 injections at a month's interval of the blood of a guineapig infected with a strain of *T. gambiense* from a Mayumbe (Congo Belge) patient, which had been passed through 22 or 23 guineapigs. Details are given of each of the 11 inoculated baboons.

Of the 5 animals inoculated with *T. brucei* one died a year later and another 2 years later examination of the brains furnished no evidence of trypanosomiasis. A third baboon remained negative for a year and then died, but no post-mortem was made—the other two remained healthy for 3 years.

Of the 6 animals inoculated intrathecally with *T. gambiense*, two died after 2 years without signs of trypanosomiasis, one was accidentally killed after 2 years and was apparently healthy and two others remained well for 3 years. Only one animal died 2 years after inoculation.

from characteristic cerebrospinal trypanosomiasis. The course of the infection was very interesting. The baboon did not exhibit any symptoms and its cerebrospinal fluid remained but slightly changed (30 cells per mm. with 0.60 of protein and free from trypanosomes) for almost two years. suddenly at the beginning of the third year it was discovered that the cerebrospinal fluid contained more than 200 cells per cmm and trypanosomes which on inoculation into guineapigs and mice proved to be *T. gambiense*. Three days later the monkey exhibited very definite symptoms of cerebrospinal infection and died of the disease about four months later.

A study of the pathology of the brain was made by van Bogaert and his findings have already been summarized in a previous paper [see above p 657].

The next portion of the paper deals with experiments undertaken to ascertain whether the serum and cerebrospinal fluid of *Papio jubilaeus* of Katanga exhibited the protective or curative action commonly seen in the serum of baboons. The fluids were tested on guineapigs infected with *T. gambiense* and the results failed to provide any evidence that either the serum or the cerebrospinal fluid of *Papio jubilaeus* exerted a protective or curative action.

In view of this it was decided to inoculate two young *Papio jubilaeus* intraperitoneally with a view to ascertaining whether they could be infected in this way. In the first the trypanosomes persisted in the peripheral circulation in small numbers for some days. The second however showed a definite blood infection. About two weeks after inoculation numerous trypanosomes were found in the peripheral blood and the animal had a definite febrile disturbance. In a day or two the trypanosomes disappeared from the blood which remained negative, apart from one occasion when very scanty parasites were found, until the death of the animal, which took place two months after inoculation. Before death the baboon developed palsy in its posterior limbs but its blood was negative and post mortem examination failed to reveal any lesion which could be definitely ascribed to trypanosomiasis.

The authors are of opinion that this blood infection of *Papio jubilaeus* in Katanga confirms their previous experimental findings that the serum does not contain protective substance.

II Y

HERRICK (C. A.) & CROSS (S. L.) The Development of Natural and Artificial Resistance of Young Rats to the Pathogenic Effects of the Parasite *Trypanosoma lewisi* — Jl Parasitology 1936 Apr Vol. 22. No 2. pp 126-129

A wild strain of *T. lewisi* was found to be pathogenic to young and not to old rats. Its virulence did not vary to any appreciable extent. It never became pathogenic to old rats and remained pathogenic to young ones. Another strain of *T. lewisi* which had been maintained in laboratory animals for 7 years behaved in exactly the same way.

The authors set themselves the problem of determining the age at which young rats became resistant to the pathogenic effects of this parasite. White rats in good condition were employed. The test animals were separated into groups of various ages ranging from 2 to 40 days. In every case except in the two-day-old group the infected and control animals were all male litter mates. The inoculations were

made intraperitoneally, and the number of trypanosomes given varied according to the weight of the animal.

The rats were divided into two categories (1) those that were allowed to suckle their mothers and (2) those that were weaned. The suckling young were divided into 4 groups according to age as is shown in the following table --

TABLE I

Showing the death rate in a group of rats infected with *T. lewisi* and their uninfected litter-mate controls.

	Suckling				Weaned		
	Experimental						
Age in days	2	10	20	30	20	30	40
No. of rats	10	20	50	25	118	23	5
No. of deaths	0	0	2	0	100	19	1
Percentage which died	0	0	4	0	84.7	78	4
Uninfected controls							
Age in days	2	10	20	30	20	30	40
No. of rats	0	20	43	0	98	23	4
No. of deaths	0	0	0	0	3	1	0
Percentage which died	0	0	0	0	3.1	4	0

From these results it appears that there is a very definite age resistance developed by the young rats to the pathogenic effects of *T. lewisi* and that the resistance is well established by the time the rats are 40 days old. It is also apparent that for some reason, which cannot be at present explained the suckling rats were protected from the effects of the parasite. They were not immune to infection, because all became infected and showed a large number of trypanosomes in their peripheral blood. Furthermore, the mothers were shown not to be immune as they were successfully infected at the close of their lactation period.

Owing to the fact that the development of age immunity was so definite, an attempt was made artificially to increase the resistance of the young rats so they would not be affected by trypanosomes. This was done successfully in two ways (1) by implanting the pituitary glands of adult non-immune rats intramuscularly into the young susceptible animals and (2) by injecting oestrin subcutaneously into the young rats. Why the implanting of pituitaries or the injection of oestrin made them more resistant to the effects of an infection of *T. lewisi* cannot be answered at this time but work on the problem is proceeding.

RENICK (L.) SMITH (C. V.) & PEDLOW (J. T.) On the Glucose Metabolism of Trypanosomes (*Trypanosoma equiperdum* and *Trypanosoma lewisi*) — *J. Biol. Chem.* 1936, Feb. Vol. 115, No. 1 pp. 75-83. [14 refs.]

This paper reports experiments by which the main steps in the breakdown of glucose by *Trypanosoma equiperdum* and *T. lewisi* have

been established it is of a technical nature and must be consulted in the original by those interested. Apparently the mechanism of glucose decomposition is very different in the two cases while *T. equiperdum* produces two 3-carbon atom compounds *T. lewisi* forms a 2 and a 4-carbon atom.

W Y

TALIAFERRO (William H) & PAVLINOVA (Yelena) The Course of Infection of *Trypanosoma duttoni* in Normal and in Splenectomized and Blockaded Mice.—*Jl Parasitology* 1936 Feb Vol. 22 No 1 pp 29-41 With 5 figs. [11 refs.]

The authors summarize their paper as follows —

1 The normal course of infection of *T. duttoni* in the normal white mouse approximates that of *T. lewisi* in the normal white rat, but there are striking quantitative differences.

(a) Reproductive activity in *T. duttoni* is less and generally only a fraction of that observed in *T. lewisi* during the first of an infection but continues at a minimal rate for several weeks.

(b) The number of trypanosomes is ordinarily much less than in infections of *T. lewisi*.

2 Both the reproductive activity of *T. duttoni* and the severity of resulting infections are greatly enhanced by splenectomy and India ink blockade carried out prior to infection. They are also adversely affected by intercurrent infections. Although part of this difference is due to a lowering of acquired resistance (ablastin formation) it is largely due to a lowering of the natural resistance of the mouse. This fact is of particular interest in showing that both natural and acquired resistance to the reproduction of the trypanosomes is dependent upon macrophage function.

W Y

RODEHAIN (J) & HENRY (E.) Localisation cutanée du *Trypanosoma marocanum* chez le cobaye. [Cutaneous Localization of *Trypanosoma marocanum* in the Guinea-pig.]—*C R Soc Biol* 1936 Vol 121 No 13 pp 1389-1390 With 2 figs

In a previous paper Rodhain has drawn attention to cutaneous lesions which appeared in a guineapig infected with *T. marocanum*.

In general guineapigs infected with the authors strain of *T. marocanum* succumbed from the acute disease within about 30 days. Sometimes towards the end of the infection the external genitalia and neighbouring regions became oedematous. Whilst the dermis itself was thickened it was especially the infiltration of the sub-dermal tissues which characterized this external manifestation of the acute infection.

With the object of obtaining chronic infections, guineapigs were treated with subcurative doses of souadlin. It was found that 0.2 or 0.3 cc. of neo-antimony given subcutaneously caused the disappearance of trypanosomes from the peripheral blood for 10 to 15 days. If the treatment was repeated when the animals relapsed it was sometimes possible to keep them alive for several months although in order to do so particular care was necessary especially when the animals developed pronounced oedema under the abdomen.

By this means it was possible to follow closely the slow development of the infection and the presence of trypanosomes in the blood and in the skin was observed systematically at various stages of the disease. The blood from the ear was examined in thick drop preparations.

In order to obtain a drop of serous fluid from the skin a nick was made with a fine pair of scissors and pressure applied to the surrounding oedematous region by the thumb and forefinger—in this way a drop of serous fluid containing only a few red cells was caused to exude. It was observed that in these chronic infections trypanosomes appeared in the skin after one or two trypanolytic crises. They were often numerous in the skin when scanty in the blood. [A similar state of affairs is of course well known in rabbits and other animals in which trypansomiasis is a chronic infection.]

W F

PAXIER (R.) *Essai de culture de Trypanosome levis dans le latex d'Euphorbia characias et Euphorbia esculenta* [Attempt at culturing *T. levis* in the Latex of *Euphorbia characias* and *Euphorbia esculenta*]—*C R Soc Biol* 1936, Vol. 122, No. 16, pp. 29-30

In 1923 FRANCHINI attempted to cultivate different flagellates in latex but he obtained only moderate success. The author has tried to adapt *T. levis* to a latex. In his first experiments he used a mixture consisting of equal parts of blood and latex and cultured the trypanosomes in hanging drop preparations. After 60 hours [temperature not stated] the trypanosomes were immobile and would not stain well. As the controls in which blood alone was used, gave similar results, it is concluded that the latex was not toxic to the trypanosomes.

In later experiments the cultures were made in tubes. The latex of *Euphorbia characias* was mixed in different proportions with the semisolid medium of Wenyon, and the mixture sterilized at 120°C. for 15 minutes. Under such conditions living trypanosomes, which stained well, could be found in certain tubes up to the 5th day. The following day the trypanosomes seemed to have lost their undulating membrane and there were numerous agglutinations.

The author believes that experiments of this sort will establish a parallelism between the flagellates of *Euphorbia* and those of insects and of vertebrates.

W F

SINGER (Ernst) *Die Wirkung der Chemotherapeutica auf die Trypanosomenzelle. (The Action of Chemotherapeutic Substances on the Trypanosome Cell.)*—*Ztschr f Hyg u Infektionskr* 1936, Feb 10, Vol. 117, No. 6, pp. 752-756.

Experiments were undertaken with the object of investigating, by means of the methylene blue decolorization method of Thomsen, the influence of chemotherapeutic substances on the dehydrogenase of trypanosome cells.

The technique employed was briefly as follows—

In vitro experiments. A suspension of trypanosomes was obtained in plasma and sufficient 5 per cent. glucose and 0.1 per cent. methylene blue solutions added to make the final concentration of glucose 0.5 per cent. and that of methylene blue 1 in 50,000. To each of a series of small tubes 0.9 cc. of this suspension was added, and then 0.1 cc. of suitable concentrations of various drugs. After the air in the tubes had been exhausted by a powerful water pump the tubes were sealed and placed in a water bath at 37°C.

In vivo experiments. Mice at the height of a nagana infection were given an intramuscular injection of the various drugs and then bled after suitable intervals. Trypanosome suspensions containing about 100 million trypanosomes per cc. were prepared and dealt with as above.

The action of the various drugs on the discolourization time of the methylene blue due to hydration of the trypanosomes was then examined. The results are given in a table in which the values are based on the time taken for the control tubes (without drug) to become decolourized. As the number of trypanosomes varied in the different experiments the figures in the table which represent the results obtained in a number of experiments are calculated on the assumption that the controls were discoloured in 100 units of time.

The table shows that all the drugs which act on trypanosome infections, e.g. atoxyl, solusalvarsan, sulfoharnstoff, germanin and triparanol hinder dehydration when present in higher concentrations and increase it when present in lower concentrations.

From the *in vivo* experiments it appears that the trypanosomes removed 20 to 30 minutes after the injection of an active dose of a chemotherapeutic substance show a retardation of the dehydration process.

The injection of active doses of a chemotherapeutic substance causes the disappearance of trypanosomes from the circulation through phagocytosis by the cells of the reticulo-endothelial system. It is known that this system takes up only such substances as wander towards the anode. Normally trypanosomes migrate towards the cathode and the question arises whether chemotherapeutic substances so change trypanosomes that they tend to pass towards the anode.

Eosin is not taken up by normal trypanosomes. When however this dye is injected into an infected mouse 2 to 4 hours after a dose of germanin, sulfoharnstoff or neosalvarsan it is found, when blood preparations are examined under the fluorescence microscope that scanty trypanosomes have taken up the dye. The reason why so few stained trypanosomes are to be found is that the damaged individuals are immediately removed from the circulation by the reticulo-endothelium.

W Y

GRUHZIT (O. M.) with the assistance of W. D. LINDSAY G. HENDRICKS & M. C. DODD. Mapharsen ("Arsenoxide") in the Therapy of Experimental Syphilis and Trypanosomiasis.—*Arch. Dermat. & Syph.* 1935 Dec. Vol. 32. No. 6 pp 848-867 With 7 figs. [18 refs.]

Experiments described in this paper were undertaken with the object of ascertaining the value of arsenoxide in the treatment of spirochaetosis and trypanosomiasis. The preparation used is called mapharsen. It is meta-amino-para hydroxyphenylarsonic oxide and contains 29.01 per cent of metallic arsenic.

The M.L.D. of mapharsen for albino rats given intravenously was about 20 mgm. per kilogram and the M.T.D. about 18 mgm. For rabbits the M.L.D. used was about 16 mgm. and the M.T.D. about 14 mgm. per kilogram. When given intramuscularly the M.L.D. for rats was 24 mgm. per kilo and the M.T.D. about 22 mgm.

When injected intravenously into dogs in a dose of 1 mgm. per kilo twice weekly for 9 doses and in a dose of 2 mgm. twice weekly for six doses the drug caused neither albuminuria nor an increase in the total nonprotein nitrogen or the sugar content of the blood. The administration was not followed by any untoward symptoms such

as diarrhoea, nausea, vomiting or general weakness. A dose of 3 mgm. per kilo. caused occasional salivation, and a dose of from 4 to 5 mgm. once weekly frequently caused vomiting, salivation and albuminuria. Intramuscular injections into dogs of 5 mgm. per kilo. once weekly for 8 weeks caused neither vomiting nor albuminuria.

The M.E.D. of mapharsen given intravenously to albino rats infected with *T. equiperdum* was 1 mgm. per kilo. as compared with 16 mgm. and 22 mgm. for arsphenamine and neocarsphenamine respectively. The therapeutic indices of the three substances were 13, 14, and 9 respectively.

The sterilizing doses for rats infected with *T. equiperdum* were 2 mgm., 12 mgm. and 24 mgm. per kilo. for mapharsen, arsphenamine and neoarsphenamine respectively, and the corresponding curative indices were accordingly 9, 11.6 and 8.3 respectively.

In rabbits 1 mgm. per kilo. of mapharsen cleared lesions (the oedema subsided and the lesions became dry and cicatrized) due to *S. p. fulvula* in from 12 to 36 hours. A dose of 10 mgm. per kilo. of neocarsphenamine cleared similar lesions in from 24 to 48 hours. The lesions in syphilitic rabbits had healed completely within 7 days after doses of 1 mgm. and 10 mgm. of mapharsen and neoarsphenamine, respectively.

The protective effectiveness of mapharsen in doses of 1 mgm. per kilo. given 48 hours after inoculation with *S. p. fulvula* and repeated three times in two weeks or in a single dose of 2 mgm., was about 100 per cent. for rabbits. A single dose of 30 mgm. of neocarsphenamine was required to protect 100 per cent. of the rabbits. With single doses the sterilizing indices of the two drugs were about equal, but with repeated doses mapharsen appeared superior to neocarsphenamine. Intramuscular injections of mapharsen possessed about the same therapeutic value as intravenous injections.

The general conclusion reached is that mapharsen in experimental trypansomiasis and syphilis appears to be well tolerated, and to possess at least as high a therapeutic value as neocarsphenamine.

H. F.

ROUBERT (E.) & TELLIER (M.). Infection expérimentale de *Glossina palpalis* par un coccobacille pathogène pour les muscides. (Experimental Infection of *G. palpalis* by a Coccobacillus Pathogenic for Muscidae).—*Bull. Soc. Path. Exot.* 1936, Feb. 12, Vol. 29, No. 2, pp. 145-147.

Recently the authors have described the spontaneous infection of *G. morsitans* by a coccobacillus. This is the first pathogenic organism for tsetses known. It can be isolated in pure cultures, and from the cultures fresh *G. morsitans* can be infected. The infection is taken up by the proboscis when the glossina bites an animal the skin of which is soiled by the culture. The *G. morsitans* dies of a septicemia within one to three days after biting the skin of a guinea-pig soiled with a 24-hour culture of the organism. The coccobacillus is equally pathogenic for *Musca domestica*.

The present paper records experiments to ascertain whether the organism is pathogenic for *G. palpalis*. It was found that this tsetse did develop an infection of the coccobacillus, but that it was less sensitive to the infection than was *G. morsitans*.

H. F.

CHAGAS (Evandro) Summula dos conhecimentos actuais sobre a Trypanosomiasis americana. [Review of Present Knowledge of American Trypanosomiasis]—*Mem Inst Oswaldo Cruz*. 1935 Vol. 30 No 3 pp 387-416

As the title indicates this article summarizes the present knowledge of the parasite, *T. cruzi*, its characters transmission reservoir hosts the symptoms it produces and the pathology of the infection. No one could do this better than Dr Evandro Chagas who has been occupied in close study of the disease since it was first described by Carlos CHAGAS in 1909. The author reviews in order the geographical distribution and incidence of the disease the Trypanosome and its evolution in the insect transmitter and in the vertebrate hosts. He considers the question of *T. verpertilionis* in bats its similarity to *T. cruzi* but suspends judgment as to its identity with the latter. The symptoms of the disease in man and the pathology are described. The former according to whether the form is acute or chronic and cardiac or nervous. That the disease occurs in goitrous districts is known but the older idea that there was a goitrous form of the disease is no longer maintained as the author states. Up to the present there is no experimental confirmation of [Carlos] Chagas theory that the goitre occurring in these regions is due to infection by *T. cruzi*. There follows a short section on diagnosis and a few words on prophylaxis. Specific treatment at present there is none. Drugs with trypanocidal action have been tried by many investigators without success (Não existe até ao presente momento tratamento específico para a trypanosomíase americana. Medicamentos de ação trypanosomicida têm sido experimentados por numerosos pesquisadores sem qualquer êxito.)

H H S

JOHNSON (C. M.) & DERIVAS (G. T.) Six New Cases of Chagas' Disease in Panama with Review of Previous Cases—*Amer Jl Trop Med* 1938 Jan Vol 16 No 1 pp 47-57

Since the discovery of Chagas disease in Panama in 1931 13 cases have been reported one of which terminated fatally. The authors give details of this additional case including two fatalities collected by them since March 1935.

Apparently no age is exempt from the disease as the youngest patient was three months and the oldest 74 years of age. Seven of the 19 cases occurred in children under three years of age and of these three ended fatally. Of the non fatal cases all but two were discovered accidentally during malarial surveys. In this group symptoms and signs of Chagas disease were practically absent. There was a history of general malaise accompanied by a few paroxysms of fever.

In the three fatal cases reported in this paper as well as in the fatal case reported by DeCOURSEY the outstanding lesion in the heart was a diffuse inflammatory type associated with a considerable degree of damage to the muscle fibres themselves. In the brain the lesions were focal and consisted of collections of nests of cells in which occasionally were seen clumps of parasites. The neuroglia were the elements which were infected. In both the heart and brain the various developmental stages of the parasites were seen.

In view of the scarcity of the trypanosomes in the peripheral blood diagnosis is a matter of difficulty and it would seem not unlikely that

In the past some cases of Chagas' disease have been mistakes for malaria. The authors consider other reasons for believing that the incidence of Chagas' disease on the Isthmus of Panama is higher than has been suspected hitherto.

H Y

MUZZA (Salvador), BACCHETTA (Clemente) & JAXON (Edm L.) Primer caso de forma aguda de enfermedad de Chagas y primeros animales domésticos portadores de *S. cruzi* comprobados en Corrientes.—*Comisión Buenos Aires Misión de Estudios de Patología Regional Argentina* Junio 1936 Publicación N° 28 pp. 23-33 With 4 figs.

TORRELLAS (J. F.) Consideraciones sobre la enfermedad de Chagas en Zarazá.—*Cec. Nac. de Cáracteras 1935 Dec. 15. Vol. 42 N° 2 pp. 358-361 With 4 figs. 11 map. 41 ref.*

MUZZA (Salvador) Infestación de Triatominae por Schizotrypanum en el hábitat de animales domésticos portadores del mosquito en el sur de la República (Río Negro y provincia de Buenos Aires). Nueva especie de *Triatoma* determinada en Río Negro. *Triatoma Infestation by T. cruzi Domestic Animals as Carrier in the Argentine. A New Species of Triatoma discovered in Río Negro -l nterinidad Buenos Aires Misión de Estudios de Patología Regional Argentina Juny 1936. Pubblicación N° 28. pp. 1-9 With 12 figs. 12 refs.*

In the Río Negro territory (and also elsewhere) *Triatoma infestans* exists in large numbers and heavily infected with *T. cruzi*. *Triatoma infestans* may be found in the same localities in fact in the same dwellings, as *T. infestans* but not parasitized. A new species is described in detail in the text with illustrations, and a table of measurements of the different parts, comparing them with *T. infestans*, male and female, which it closely resembles in some respects. The new species is called *Triatoma rosenbachii* after Professor F. Rosenbach who was the first to study these insects (ranchaca). Three species of *Triatoma* have now been found in the Argentine naturally infected *T. infestans*, *T. osvaldoi* and *T. rosenbachii*. In a house in the rural district of Fuerte General Roca a kitten was found carrying *T. cruzi*.

H R C

CHARAS (E.) Infection expérimentale de l'homme par le *Trypanosome cruzi*. Experimental Infection of Man by *Trypanosome cruzi*.—*C. R. Soc. Biol. 1936. Vol. 121 N° 8 pp. 769-771*

The author has continued his investigations on the experimental infection of the human being with *T. cruzi*. A volunteer (No. 7) was inoculated with the faeces of *Panstrongylus megistus* containing numerous tritidial and metacyclic forms of *T. cruzi* of human origin. The temperature rose 3 days later and trypanosomes were shown to be present in the blood by subinoculation into a guinea pig on the 14th day but were not found by direct examination by the 19th day. On the latter day the patient was re-inoculated with 2.5 cc. of the blood of a young dog containing numerous *T. cruzi*. The temperature which had not risen beyond 38.5°C. the four previous days, rose the day after the second inoculation to 39.5°C. Six hours after the second

inoculation parasites (both narrow and broad forms) were found by direct examination of the blood. The number remained stationary for 3 days and then gradually decreased until by the 8th day only a few broad forms were to be seen.

This observation proves the existence of an initial phase of blood infection. The parasites seen 8 hours after inoculation could not have come from the tissues because the time did not suffice and because both broad and narrow forms were seen. The number of parasites inoculated on the first occasion was probably too few to enable them to be seen in blood examination and possibly the metacyclic forms have a greater capacity for penetrating the tissues. The steady diminution in the number of trypanosomes seen in the blood during the days following the second inoculation was probably due to the trypanocidal action of the blood and to the localization of the remaining parasites in the tissues.

The organs of volunteer No 6 who died from malignant disease 5 months after inoculation with *T. cruzi* from a *T. taeniaeformis*, were examined. This patient also had exhibited an initial acute infection with parasites in the blood and a certain amount of fever. No parasites were found in the organs usually involved but sections of the liver showed numerous foci of infiltration by lymphocytes plasma cells and macrophages.

W Y

KOROID (C A.) WOOD (F D) & MCNEIL (E) The Cycle of *Trypanosoma cruzi* in Tissue Culture of Embryonic Heart Muscle.—*Univ California Public Zool* 1935 Vol 41 No 3 pp 23-24

Details are given of the cyclic growth of *Trypanosoma cruzi* in tissue cultures of embryonic heart of rat and mouse.

The tissue cultures were made from 14- to 16-day rat and mouse embryos. They were grown in plasma-embryo extract medium on 7.4 x 4.5 cm. slides having a depression 4 mm deep. They were incubated 24 hours at 37°C before being inoculated with culture forms in semi-solid blood agar medium of the California strain of *T. cruzi* from the wood rat. Cultures were examined at frequent intervals during the first 24 hours after inoculation, and at least twice daily thereafter for 6 days.

Some of the crithidial culture forms used in the inoculum survived in the medium as long as the experiment lasted (7 days) and apparently continued to multiply. During the first 24 hours there was a decrease in the number of trypanosome forms in the culture medium these seemingly being the forms which entered the tissues. After 48 hours the free-swimming trypanosomes were very rare or absent. In cultures 24 hours old trypanosomes and many crithidias could be seen adhering to the muscle tissue fibroblasts and macrophages. Although several of the adherent forms were watched for 20 minutes actual penetration of the cells was not observed.

The opacity of the muscle made it difficult to determine what was taking place within it, but the macrophages fibroblasts and extra cellular parasites could be easily observed. At 24 hours many macrophages contained from one to several motile flagellates. On the third day granular débris from degenerating macrophages was observed to contain wriggling flagellates. No flagellates were seen in the fibroblasts.

Trypanosomes of the type found in the circulating blood were first seen on the 5th day after inoculation. They were at first localized

as they emerged from the massed leishmaniform phases, and were generally shorter than the long slender metacyclic forms which occur in the culture tube and insect vector. These blood forms were often found in loosely associated groups in the plasma surrounding the heart muscle from which they had recently emerged.

In the sectioned material of 24-hour preparations, macrophages containing one or two parasites were numerous. These parasites were either in the crithidial or leishmania stage, probably the former. Although these crithidial stages are not supposed to be infective, it is obvious that they enter or are ingested by macrophages, and that they may survive the death of the cell. Possibly they eventually develop into infective forms, either within or outside of body cells.

Groups of typical leishmaniform bodies were first seen in sectioned heart muscle on the 4th day after inoculation. Some of the groups were typical with no flagella, whilst others were of the stumpy crithidial type with short flagella. A few groups of very slender trypanosomes with round or oval parabasals were noted.

The authors conclude that the development of *T. cruzi* in tissue cultures of heart muscle is the same with respect to time and stage of its cycle as its development in the body of the living vertebrate host.

MARZA (Salvador) & PALAVERTI (Benito). Forma aguda benigna de enfermedad de Chagas observada en Barranqueras, Chaco.—Universidad Buenos Aires. *Revista de Estudios de Patología Regional Argentina* Jujuy 1936. Publicación N° 26 pp. 19-22. With 1 fig.

MARZA (Salvador) & VALLE (Fernando A.). Forma aguda benigna de enfermedad de Chagas observada en Puerto Tirol, Chaco.—Universidad Buenos Aires. *Revista de Estudios de Patología Regional Argentina* Jujuy 1936. Publicación N° 26. pp. 23-28. With 1 fig.

MARZA (Salvador) & CORRI (Eduardo M.). Tercera observación de forma aguda benigna de enfermedad de Chagas en Presidente de la Plata, Chaco.—Universidad Buenos Aires. *Revista de Estudios de Patología Regional Argentina* Jujuy 1936. Publicación N° 26. pp. 29-31. With 2 figs.

MARZA (Salvador) & MARCONI (Martín R.). Forma aguda benigna de enfermedad de Chagas comprobada en el departamento de Anta (Prov. de Salta) —Universidad Buenos Aires. *Revista de Estudios de Patología Regional Argentina* Jujuy 1936. Publicación N° 26. pp. 34-39. With 1 fig.

CUCURCA (Heberto). La forma cardíaca de la enfermedad de Chagas, con presentación de nuestro primer caso.—*Gac. Méd. de Cerrillos* 1935 Dec. 15. Vol. 42. N° 23. pp. 361-365. With 3 figs.

MALARIA.

PROCEEDINGS OF THE ROYAL SOCIETY OF MEDICINE 1936 Mar
 Vol. 29 No 5 pp 537-562. (Sect. of Epidemiol. with Trop.
 Dis. pp 1-26) With 19 figs.—Discussion on the Malaria Epidemic
 in Ceylon 1934-35 [BRIERCLIFFE (R.) DALRYMPLE-CHAMPNEYS
 (Weldon) WIGGLESWORTH (V. B.) & others]

This discussion was of great general interest. It comprised—Examples of misleading reports in the lay press. An outline of the measures taken and the difficulties of the task. The opener's view of the main factor in the causation of the epidemic. The sudden onset of the epidemic. The predominance of benign tertian. The secondary wave. Remarks by Dr. Wigglesworth on the habits of *A. culicifacies*. Col. James' theory of the action of susceptibility as a factor in the epidemic. Professor Schulemann's remarks on exaggerated claims for atebrin musonate. His standard treatment. Dr. Kilkis' opinion of the danger of intravenous injections. The discussion was opened by Sir Weldon Dalrymple-Champneys who read a joint paper prepared by Dr. R. Briercliffe and himself.

Misleading reports. Difficulty of task. Measures taken.—Very misleading accounts of the epidemic appeared in the lay press. For instance a report of 5 000 deaths in a particular district became 50 000 in an English newspaper and had swollen to 500 000 by the time it reached America. Again, a reporter cabled that there was a green caterpillar pest and that thousands were being burned in the Kuru negalla district. In the American papers the word caterpillar was omitted; it was reported that thousands were dying from the green pest and numerous requests were received by the Ceylon medical department for specimens of the green malarial parasite. The Opener said he could testify as an eye-witness to the splendid way in which Dr. Briercliffe had handled this unprecedented epidemic in very difficult circumstances and in the face of much hostile criticism and misrepresentation. It had been suggested by critics that the epidemic could have been brought to an earlier conclusion by widespread antilarval measures. Carefully drawn maps and calculations show that it would have been necessary to treat about 7 000 miles of watercourses. A coolie employed in antilarval work deals with about $1\frac{1}{2}$ miles a day at a cost of about 10 rupees a mile. The cost would have been out of proportion to the benefit to be expected even if the trained personnel necessary for such work had been available, which was not the case. Dr. V. B. Wigglesworth who contributed the second paper of this Discussion, stated it was noted in Ceylon during the epidemic that *culicifacies* larvae occurred not only in the marginal pools but also in the main bodies of water in the rivers. That means that the larvae must be carried downstream, and however well one stretch of river is controlled fresh larvae will be continually brought downstream to it. He said that the three spots which he visited in the East where he felt least hopeful about antimosquito measures in rural areas were the three places—the Punjab, the Madras Agency and Ceylon—where *culicifacies* was the chief malaria carrier. In spite of all these difficulties a mobile organization, consisting of locally recruited labour under trained personnel was rapidly built up in Ceylon and some 300 miles of the four main rivers and their tributaries were brought under control oiling being confined to areas in

the neighbourhood of large villages. The most important anti-malarial measure undertaken was the treatment of patients suffering from the disease. The standard treatment for adults was $7\frac{1}{2}$ grains of quinine sulphate or bisulphate in solution three times a day. Additional measures undertaken to cope with the outbreak have been described already in this *Bulletin* (see Briercliffe and also James, above).

Main factor in causation of epidemic.—The authors of the opening paper consider that the main factor in the causation of the epidemic was the prolific breeding of *A. culicifacies* in pools left in the beds of the large rivers which had been dried up by the drought. Similar pools are often present in smaller rivers even in normal years but, because the narrow streams are shaded, *A. culicifacies* does not breed in them. It selects shallow pools of still, clear water exposed to sunlight. The reason that Galle and Matara, in the extreme south of the wet zone, remained free from the epidemic was because the rainfall for the year in these districts was up to the average no actual drought occurred, the rivers were flowing as usual, *culicifacies* was not found and malaria did not occur.

Did the epidemic begin suddenly?—There is some difference of opinion as to the manner in which the epidemic began. The authors state that it began suddenly and they write, "The explosive nature of the onset was at first the characteristic feature of the epidemic."

The epidemic burst with amazing suddenness in the Deduru Oya basin which in the course of a week was completely involved.

Type of parasite and infection rate of anophiles.—Throughout the epidemic benign tertian infections predominated, the relative proportions of the three parasites from November 1934 to March 1935 being *P. vivax* 62.2, *P. falciparum* 36.7 and *P. malariae* 1.1 per cent. The proportion of subtertian infections increased, however, from 4.7 in November to 43.4 in January, and fell to 29 per cent in March. In December 12.9 per cent. of the *culicifacies* were infected and in some places the infection rate was as high as 19 per cent. Out of 5,063 anophiles collected in dwellings from November onwards, 8.5 per cent. were *A. culicifacies*.

Was the secondary wave due to recurrences?—"At the end of the first week of April, a secondary wave of malaria started to sweep over the epidemic area. It was not unexpected. The disease generally was of a much milder character during the secondary wave than during the early months of the epidemic and deaths were not so numerous. This secondary wave was not due only to recurrence, because many persons who had not previously suffered from malaria were infected, certain villages which had hitherto escaped lightly or even completely were invaded, and in the Mahaweli Ganga basin new areas were invaded. But the most interesting extension of the epidemic was upwards. In May and June, malaria broke out in villages on the banks of streams situated 3,500 to 4,000 feet above sea level. Previously at these elevations, the larvae of *culicifacies* had rarely been found and the adults never."

Dr V. B. Wigglesworth spoke of the habits of *A. culicifacies* in different parts of India, (a) In Assam, it breeds in myriads during the dry season in clear pools left in the river beds but it is of no importance because this is the cold season and no transmission takes

place. Here *A. minimus* breeding in the grassy-edged streams is the carrier (b) In the Anamalai Hills of South India *A. culicifacies* breeds in the rivers and streams but it does not thrive there during the season suitable for transmission (March to June) and it is of no importance. Here *A. stimulans* a close ally of *varuna* is the carrier (c) In the Punjab *A. culicifacies* finds breeding places every year in the smaller irrigation canals in seepages from the larger canals and in pools in dried up water-courses. Villages close to these places are centres of endemic malaria. These places have much in common with the malarious dry zone of Ceylon. In years of exceptional rainfall innumerable temporary breeding places are created wide tracts of the Punjab become infested with *A. culicifacies* and if these conditions develop after an interval during which the people have lost their immunity to malaria devastating epidemics result. As in Ceylon an epidemic is determined by the coincidence of an abundance of *culicifacies* and a non immune population. Excessive rainfall favours *culicifacies* in the Punjab excessive drought in south west Ceylon. In another part of India however the hilly districts of the Madras Agency the malaria season begins when the rivers dry up and contain residual pools. Here it is not an exceptional phenomenon as in Ceylon, but an annual event in a region of hyperendemic malaria.

Colonel S P James enunciated a theory in explanation of the importance of lack of immunity in determining an epidemic (see also James below p 684). Why is lack of immunity an important factor in causing an epidemic? According to the results of laboratory work at Horton the answer was that in non immune persons suffering from malaria, gametocytes appeared in the blood more frequently and in far greater numbers than in immune persons. When anopholes fed upon these patients their stomachs became crowded with from 300 to 800 oöcysts with the result that enough sporozoites were produced to infect many people and to keep the insect infective throughout its life. But when anopholes fed upon malaria patients possessing some immunity the number of oöcysts found on their stomachs seldom exceeded 10 with the result that the sporozoites produced were all used up in biting two or three people and the mosquito remained infective for only a very few days. Lack of immunity in the population at risk was the first requirement for the production of heavily infected mosquitoes and therefore it was an important factor in the causation of an epidemic.

Professor W Schulemann said that Simeons had stated that in peroral treatment with atebrin three days must be lost until the liver became saturated with the drug but that this statement was not in accordance with facts. He considered that Simeons practical conclusions were too far fetched. A *therapis sterilans magna* by injecting large doses was impracticable peroral treatment was to be preferred except in very serious cases and should be specially chosen to prevent relapses. He thought that atebrin misonate had many advantages over quinine when injections were required. The standard treatment to be recommended was —Atebrin 0.3 gram daily by the mouth for 5 to 7 days then plasmoquine 0.02 gram daily for 3 or 4 days. Subsequently 0.2 gram atebrin and 0.02 gram plasmoquine on one day of the week and 0.2 gram atebrin alone on another day of the week. But where good supervision was not possible or where there was a floating population, atebrin should be given without plasmoquine.

Dr Kikuth said that he was unable to commend Simeon's practice of injecting the total daily quantity of atebriin misonat at one dose. Intravenous injections both of atebriin misonat and quinine were superfluous and dangerous." W. Fletcher

GILL (C. A.) Some Points in the Epidemiology of Malaria arising out of the Study of the Malaria Epidemic in Ceylon in 1934-5.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1936. Feb. 29 Vol. 29 No. 5 pp. 427-466. With 17 figs. [23 refs.] Discussion pp. 466-490 With 2 maps & 3 charts.

The author's theory is that the epidemic began with a fulminating outbreak of relapses among healthy carriers due, apparently to an excessive increase in atmospheric humidity. The aboriginal mosquito of anopholes was not the cause, though it was partly responsible for the magnitude of the epidemic.

Colonel Gill's official Report on the Ceylon epidemic has been summarized already in this *Bulletin* 1936 Vol. 33 p. 214. In the present paper he deals more particularly with its causes. He emphasizes the powerlessness of modern medical science to prevent the outbreak of malaria epidemics or to check materially their course, though in his Report he implied that future epidemics in Ceylon might be warded off by antimalarial measures undertaken during the inter-epidemic period. He is of opinion that little can be done to control malaria except in towns and closed communities—what of the large free population of rural areas, numbering more than 80 per cent. of the total? "despite the great advance of knowledge during the past 50 years the control of malaria as a practicable proposition, is almost as far to seek as it was a century ago." In the discussion which followed the paper this pessimistic view was countered by Sir Malcolm Watson who instanced the success of antimarial work carried out by himself in a rural area of the Malabar Coast.

Colonel Gill states that the great malaria epidemics of the Punjab, Mauritius and other places have been associated with particular sun-spot phases. In Ceylon, the association of malaria epidemics with the epoch of maximum and minimum sun-spots is extremely close.

For the present it will suffice to state that the relationship of malaria epidemics to the sun-spot cycle is sufficiently close to permit of the conclusion that the cyclical periodicity of malaria epidemics is attributable to the changes in world-weather associated with periodic oscillations in solar activity.

Special weather conditions are associated with malaria epidemics in the pre-epidemic period there is a rise of atmospheric humidity. In the wet zone of Ceylon there was a failure of the south-west monsoon with a progressive decline of atmospheric humidity during July, August and September with the result that the rainfall in October, though it was below normal, occasioned a sharp rise in humidity which occurred at the end of September three weeks before the outbreak of the epidemic. The severity of the epidemic was greatest where this rise was greatest. It was very high, for example, in Kurunegala, the focal centre of the epidemic.

Such a change in humidity appears to cause "a change in the relationship of the malaria parasite and the human host, whereby at the commencement of an epidemic, an epidemic of relapses is precipitated amongst human carriers." Why does Colonel Gill believe

that the Ceylon epidemic began as an epidemic of relapses? In the first place it began with fulminating suddenness not only was the onset of the epidemic remarkably abrupt but it could often be fixed to a day. Thus at the Civil Hospital Kurunegala the daily average number of attendances which had fluctuated between 130 and 150 per diem for several months before the epidemic, was more than doubled on 29th October 1934 with the result that the total attendances which in the week ending 27th October were 1,305 numbered 2,763 at the end of the following week. It was decided to confine attention to a single locality and Kurunegala town population 10,500 was selected for this purpose partly because it was the most severely affected large town in the island, and partly because exceptionally complete statistical data were obtainable. A second point in favour of the relapse theory was that very few children suffered during the first few weeks of the outbreak. It is difficult to believe that the morbidity amongst adults during this period could have been mainly caused by new infections since it would imply that infected anophelines had selected adults alone for attack. Furthermore, it would be necessary to assume that a large number of anophelines had become infected from such human carriers as existed during a period of good health and had thereafter dispersed and, in due course infected a large number of persons (excluding children) about the same time who after an identical incubation period, commenced to fall ill together. This sequence of events is too improbable to call for serious consideration, and it is therefore held that the sickness during the first month of the epidemic was mainly due to an epidemic of relapses amongst apparently healthy human carriers.

The next step in the epidemic was the spreading of the infection from the relapsed cases to the surrounding non immune population by an abnormal abundance of anopheles. *A. culicifacies* in normal times is not prevalent in the Wet Zone where the epidemic occurred, it is much less common there than in the Dry Zone but in 1934 it was extremely prevalent much to the south of its normal habitat and bred freely among the pools in the beds of the dwindling rivers. The coincidence of the following was responsible for the magnitude and severity of the epidemic. (1) A large number of relapses following an abnormal rise in atmospheric humidity associated with cyclical sun-spot changes (2) An abnormal prevalence of the carrier species of anopheline *A. culicifacies* (3) A non immune population suffering from privation due to the drought.

In the discussion which followed, Colonel S P JAMES brought to notice a suggestion made to him by Dr DE VERTEUIL of Trinidad that the onset of rain after the 1934 drought in Ceylon might have caused a migration of anopheles from the malarious Dry Zone into the Wet Zone and that this was responsible for the epidemic. Migration on a small scale occurs annually in Trinidad, but, at intervals and after a prolonged drought migration occurs on an immense scale.

W F

Ellisow (F O'B) Malaria Epidemics and Sun-Spot Cycles — Trans Roy Soc Trop Med & Hyg 1936 Apr 8 Vol 29 No 6 pp 859-885

Colonel Gill (above) has suggested that a definite correlation exists between the maximum and minimum development of

sun-spots and epidemics of malaria. The relation between malaria epidemics and sun spot activity is not as close as Gill would have us believe either in Ceylon or elsewhere. The last two outbreaks in Ceylon 1834 and 1928 do it is true coincide with a minimum and a maximum of sun-spots but from 1923 back to 1905 epidemics both in Ceylon and elsewhere taking Gill's own dates with one or two necessary corrections have prevailed during one and a half complete sun-spot cycles with absolute impartiality at sun-spot maximum, minimum and every stage in between.

W F

JAMES (S P) NICOL (W D) & SHUTE (P G) Clinical and Parasitological Observations on Induced Malaria. (With Notes on their Application to the Study of Malaria Epidemics by S. P. James).—*Proc Roy Soc Med* 1936 June Vol. 29 No. 8 pp 879-893 (Sect. Trop. Dis. & Parasit., pp 27-41) With 16 figs

[This is a very important and interesting paper. Colonel James' theory of the Ceylon epidemic, based upon experiments with the Madagascar strain at Horton Mental Hospital, seems to be as follows. There was a great increase in the number of anophèles—the population was non-immune. Malaria increased gradually until a point was reached where transmission among the highly susceptible population was being repeated at a great rate. This procedure (as shown by observations at Horton) results in a fundamental change in the nature of the endemic strain of parasite which becomes converted into an epidemic strain—the special attribute of such an epidemic strain is its reproductive vigour—it increases much more rapidly in the blood, and it produces many more gametocytes. This produces a far heavier infection of anophèles, and, consequently a much heavier dose of sporozoites of the vigorous epidemic strain is injected into the host. This is responsible for the severe type of disease characteristic of epidemic malaria.]

Colonel James made the interesting statement during his lecture, that atebrin acts as a causal prophylactic, destroying the sporozoites of benign tertian malaria.]

Epidemic malaria and endemic malaria differ from one another clinically. Endemic malaria is comparatively mild and seldom fatal, but epidemic malaria is severe and often fatal. What is the reason? It is generally attributed to lack of resistance due to poverty, heat and the like which sometimes, as in Ceylon happen to coincide with the epidemic. The author's work at Horton has led him to other conclusions—he ascribes the clinical malignancy of epidemic malaria rather to a change in the nature of the attacking parasite than to a change in the defensive powers of the host. The change in the parasites which we have observed at Horton (and which we think may be the change that is responsible for the severity of epidemic malaria) is not an increase of virulence, but an increase of physical vigour and vitality leading to the production of individuals which represent the species in its perfect form. In these individuals the normal processes of reproduction, sexual as well as asexual, are carried on in the most regular and complete manner of which the species is capable. The number of parasites exceeds considerably the number which appears in the blood of persons infected with a less active strain and the result of using a strain which reproduces itself freely and vigorously is that non-immunes of normal

susceptibility who are infected with it develop the severe epidemic type of the disease. Colonel James did not describe in detail the technique by means of which he brought the endemic Madagascar strain to the degree of physical vigour and activity in which it caused cases of the severe epidemic type but an essential part of this technique consisted in passing the strain repeatedly through persons who possessed no resistance to malarial infection. When this change to epidemic type has been effected the strain produces gametocytes earlier and in greater numbers. Normally no gametocytes are found during the first five days in patients infected with the Madagascar strain and in only 33 per cent are they found during the first week but after the strain has been passaged according to Colonel James's plan gametocytes are found in some cases as early as the third day and in 82 instead of 33 per cent they are found during the first week. The number of gametocytes in the blood is much more numerous after the plan than before it and mosquitoes are much more easily and heavily infected it was with this object that the plan was originally devised. As regards the clinical change, after the plan the onset of fever is more like that seen in a subtropical infection than in benign tertian it begins as an irregular fever without rigors which increases daily until by the 5th or 6th day there are one or two paroxysms every day finally parasites become so numerous and the patient becomes so ill that the attack must be cut short by quinine. There is usually a relapse or recrudescence 3 weeks later and one or two more afterwards at similar intervals. Subsequently there is a long period of freedom and then suddenly a sharp recurrence at about the 7th month which may be followed by several recrudescences. How can a relapse be distinguished from a primary attack? By the temperature chart and by blood films. A relapse begins abruptly with a rigor instead of gradually like a primary attack subsequently there are paroxysms every other day instead of every day and gametocytes are present as early as the first or second day.

Colonel James next considered the dose of infection. Infection by the bites of two or three lightly infected mosquitoes is usually quite different from the result of infection by the bites of many heavily infected insects. When only a small dose of sporozoites is injected the result is an abortive primary fever which passes off in two or three days or there is no primary attack at all and the infection remains latent. In either case seven months later at a period corresponding with the period of recurrence in the severe type there is a sudden sharp attack. This observation is a repetition in the laboratory of what happens in countries like Holland where (because only one or two lightly infected mosquitoes are responsible for each indigenous case) most of the cases are abortive or latent in the primary attack and are only detected at the period of recurrence in the following spring. In benign tertian malaria the condition of latency can always be produced by a few prophylactic doses of alebrin which kills most but not all sporozoites injected by a mosquito. The recurrences or late relapses which appear 7 months after the primary attack of benign tertian occur only in cases infected by the bites of mosquitoes they are never seen in cases induced by the inoculation of malarial blood. Recurrences are not in any way dependent on climate season or atmospheric humidity. In India the onset of recurrences between six months and a year after anti relapse schemes of treatment upsets

sun-spots and epidemics of malaria. The relation between malaria epidemics and sun-spot activity is not as close as Gill would have us believe either in Ceylon or elsewhere. The last two outbreaks in Ceylon, 1934 and 1928 do it is true coincide with a minimum and a maximum of sun-spots but from 1923 back to 1905, epidemics both in Ceylon and elsewhere, taking Gill's own dates with one or two necessary corrections, have prevailed during one and a half complete sun-spot cycles with absolute impartiality at sun-spot maxima, minimum and every stage in between.

J. F.

JAMES (S. P.) NICOL (W. D.) & SHAW (P. G.) Clinical and Paradoxical Observations on Induced Malaria. (With Notes on the Application to the Study of Malaria Epidemics by S. P. James).—*Proc Roy Soc Med.* 1936. June. Vol. 29 No. 8 pp. 87-893 (Sect. Trop. Dis. & Parasit. pp. 27-41) With 16 figs.

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almost no anopholes an invasion by great numbers of these insects can give rise to a serious epidemic provided the population at risk possesses no immunity to the disease. It is equally true that areas in which there are plenty of anopholes but no gametocyte carriers may almost immediately suffer from an epidemic when a number of gametocyte-carrying cases are imported.

W F

GILL (C. A.) The Mode of Onset of the Malaria Epidemic in Ceylon —
Trans Roy Soc Trop Med & Hyg 1936 June 30 Vol 30
 No 1 pp 101-107

A study of temperature charts and of records of blood examinations received from Ceylon led Lt.-Col. S P JAMES to the conclusion that the 1934-35 epidemic of malaria in that island started gradually and was associated with a slow steady increase of primary infections. Colonel GILL on the other hand is of the opinion that the epidemic started suddenly by means of an epidemic of relapses [ante pp 213-220 and also above].

In the paper under consideration Colonel GILL reproduces tables of hospital and dispensary returns and of blood examinations of residents of Colombo which he considers supports his thesis that the onset of the epidemic was associated with a sudden outbreak of relapses which was followed about one month later by a sudden outburst of primary infections.

Norman White

FERNANDO (P B) & SANDARASAGARA (A P) A Clinical Study of 847 Patients treated for Malaria during the Ceylon Epidemic of 1934-1935 —*Ceylon Jl Scs* (Sect. D Med. Sci.) 1935 Dec. 3 Vol 3 Pt. 4 pp 195-233 With 1 fig [19 refs]

Relapses are more frequent after atebrin than after quinine. Atebrin is more toxic than quinine or plasmoquine.

The 847 cases were under the authors care in the General Hospital, Colombo. Benign tertian was common at the beginning but during the explosive stage of the epidemic subtertian infections predominated as it declined the proportion of benign tertian cases increased. The case mortality was 4.3 per cent. but more than a quarter of the fatal cases were moribund on admission. There were 54 cerebral cases and 19 of an oedematous type which appeared to belong to the same category as war oedema or starvation oedema. The patients were treated as follows (according to Table I which does not include all):
 (1) Quinine 21 grains daily for 7 days, or for period of stay in hospital — 220 cases. (2) Atebrin 0.3 gram daily for 5 days — 144 cases. (3) Atebrin and quinine in the above doses for 5 days — 39 cases. (4) The same with 0.02 gram of plasmoquine daily for 5 days — 28 cases. (5) Quinine 21 grains daily and plasmoquine 3 grains daily — 10 cases [This is probably a misprint 3 grains is equivalent to nearly 0.2 gram.]

The authors concluded that quinine was superior to atebrin in bringing down the temperature and in preventing relapses. There were about 3 times as many relapses after atebrin as after quinine. Toxic symptoms occurred in 3.3 per cent. of 299 cases treated with atebrin and one patient died as the result of atebrin poisoning. In another pain starting on the 5th day was severe enough to require morphia two patients collapsed after 3 days treatment [the details

of the fatal case are not very convincing—the patient had received, apparently only 6 tablets]. The authors consider atebrin contraindicated in cases of kidney disease and intravenous quinine contraindicated when the blood pressure is below 5.90. They conclude that quinine is still the most valuable anti-malarial drug available and that atebrin is more toxic than quinine or plasmoquine. Plasmoquine they found non-toxic when given in doses of 0.02 gram daily for 5 to 8 days.

W F

SINTON (J. A.) A Discussion of Some Points contained in the "Third General Report of the Malaria Commission" on "the Therapeutics of Malaria." —*Quarterly Bull. Health Organisation League of Nations* Geneva 1935. Dec. Vol. 4 No. 4 pp. 643-75 [25 refs.]

The author attacks the Commission for saying that it is useless to give plasmoquine or alkalies with quinine. He regards much of the advice given in the Report as impracticable or dangerous to life.

His first criticism is that while it is stated on the first page of the Report [this *Bulletin* 1933 Vol. 30 p. 837] that it is based on the findings of research workers in several countries as the result of their experience with cinchona alkaloids and synthetic remedies in the field, yet, as one reads further one finds that the bulk of the work to which prominence is given was conducted under laboratory conditions in medical hospitals and further almost at the end of the Report, one finds the statement that the subject is dealt with "from the point of view of persons who are in a position to obtain expert medical advice and efficient care rather than from that of the mass of the population of malarious countries." While he admits that the Report is most valuable to a certain class of research worker it has come to his notice that in many instances, it has hindered rather than helped the clinician in the tropics.

Colonel Sinton has reported excellent results in the prevention of relapses by the administration of a combination of quinine and plasmoquine. The Commission in their Report consider that this treatment is of doubtful value and that the claim that giving plasmoquine in addition to quinine prevents relapses can only be described as paradoxical." In confutation the author cites the results of the treatment at Hasauh —

In the early days of the Malaria Treatment Centre when intractable chronic relapsing cases of malaria were sent to Hasauh from all over India, these were mainly benign tertian infections. In those days when the use of different cinchona alkaloids was being tested, the Centre had nearly about 200 patients and a waiting-list of many others requiring admission. Since the introduction of the combined quinine and plasmoquine treatment as a routine in the army more especially for the treatment of such quinine-intractable cases the numbers fell so low that the Centre had to be closed. By this means a much higher percentage of permanent cures can be obtained under certain conditions than with quinine therapy or with plasmoquine alone in non-toxic doses. In the work of the Malaria Treatment Centre it was shown that the combined treatment with plasmoquine reduced the number of parasitic and clinical relapses in chronic benign tertian infections to about 10 per cent. during an observation period by blood examination of at least 8 weeks after the termination of treatment. On the other hand with any course of treatment with the cinchona alkaloids alone the relapse rate in this type of case averaged about 65 per cent. in the same period.

The daily dose of plasmoquine recommended is 0.015 gram under medical supervision.

The Commission states in its Report that owing to lack of knowledge of the natural course of benign tertian malaria and of the most important type of relapse which occurs about 8 months after the primary attack the results of all clinical tests conducted prior to 1931 were quite misleading. The author writes—From a consideration of the objections raised by the Commission in its Report it does not appear to me that such a sweeping statement is justified in the case of the infections studied at the Malaria Treatment Centre Kasauli before 1931. There is considerable evidence to show (2) That the patients were observed under much more natural conditions than in mental hospitals (3) That with the method of observation used the occurrence of late relapses in the natural course of benign tertian malaria does not invalidate the results obtained to any marked degree and (4) That the findings recorded have proved of much practical value to workers in India. He suggests that even if one admits that late relapses are a normal event and not a peculiarity of the particular strains with which the Commission worked the infection would have been detected during the regular routine thick film examinations made during the first 8 weeks after the cessation of treatment at Kasauli. With reference to subtertian malaria he writes—

In condemning or depreciating the results recorded with the quinine and alkali treatment of malignant tertian malaria the Commission appears to have overlooked its own statements—that different drugs may react differently on different strains and to have allowed its judgment to be biased by the results of experiments with a few very virulent strains of *P. falciparum*. In view of the great differences in the reaction of different strains to therapeutic agents I cannot understand why the Commission is unable to accept the results of our Indian work.

It is suggested in the Report that relapses are more easy to cure than primary attacks but most of the author's Kasauli patients had had 3 or 4 febrile relapses before they came to him yet 65 per cent. relapsed after treatment with quinine—i.e. appreciably higher than the 50 per cent. mentioned by the Commission as occurring in primary infections receiving much less treatment.

The Commission deprecates the employment of a standard treatment and advocates that each individual case should be treated on its merits taking into consideration the virulence of the strain of parasite the degree of immunity and the stage of disease whether primary attack or relapse but says the author—

Unfortunately I am unaware of any methods by which this can be done either clinically or microscopically under natural conditions there are very few places in the tropics or other malarious countries where it would be possible to carry out the lines of investigation recommended by the Commission because one would have to assume that all the strains of one species of *Plasmodium* were identical in a given area, for there is no known method of differentiating these strains by their morphological characters. Such an assumption does not seem justifiable. The patient may be infected with multiple strains of the same species of parasite. It is at present impossible under natural conditions or in the laboratory to determine with any scientific accuracy whether the attack being studied is a relapse a reinfection with a homologous strain, or a superinfection with a heterologous one.

In Sinton's "standard treatment" quinine is given in those doses which are considered necessary to cure radically within a week the majority of the strains of parasite. If the patient develops a relapse he is given a treatment which contains plasmochine in combination with quinine. Some "standard treatment" urges Colonel Sinton, is an essential measure if one is to obtain the greatest benefit of the greatest number of patients for the money available.

The Commission states that quinine has but little effect when given on the first or even the second day of the initial fever. They also state that in hospitals where there is insufficient watchfulness the fatality due to their strain of benign tertian is not less than 10 to 14 per cent. Colonel Sinton draws attention to the danger of undetected mixed infections and asks —

If delayed treatment in benign tertian infections can cause such excessive mortality even among patients receiving ordinary care in hospital, how much more dangerous is such a plan of treatment likely to be in general practice? If treatment be withheld on the assumption that a primary diagnosis of *P. vivax* is correct, the rapid development of *P. falciparum* may remain undetected until therapeutic measures are too late to save the life of the patient. However desirable such delayed treatments may be for the purposes of researches into the value of certain therapeutic agents, I do not consider that it is a measure which can justifiably be recommended for use in the majority of hospitals in the tropics nor for the practising physician of any country in our present state of knowledge.

If the development of immunity is favoured by delaying treatment, it is an immunity against the infecting strain only and will give but or no protection against other strains.

The Commission recommend different treatments for primary attacks and for relapses. They suggest that as there is little danger to the patient's life in a relapse he should be allowed to have several paroxysms before treatment is begun, and that the amount of the treatment should be small, in order that the natural process of immunization may not be interfered with. Colonel Sinton points out that a patient who returns with a malarial attack some time after the termination of treatment for the primary attack is not necessarily suffering from a relapse; it may be a fresh infection or superinfection with a heterologous strain or species of parasite. "If such a case be treated by the method which is recommended by the Commission as suitable for a recrudescence or a relapse it may be too late to save the patient's life when proper treatment is instituted."

RELAPSING FEVER AND OTHER SPIROCHAETOSSES

SHRIMPTON (E A G) A Survey of the Incidence of Relapsing Fever in China.—*Chines Med Jl* 1936 Feb Supp No 1 pp 312-344 With 6 figs. (1 map) [25 refs.]

A general account of the epidemiology of relapsing fever in China based on data obtained in the Survey of Hospital Patients for 1933 and 1934 and also from hospital reports and references to the literature.

The disease has been reported from most of the provinces of China but there are no well defined endemic areas. In typical areas a marked seasonal distribution is found with a maximum in May and June but under abnormal conditions such as famines civil disturbances over crowding etc. this maximum may occur in other months. The distribution shows an intimate connexion with temperature probably correlated with changes in the clothing habits of the population in relation to climate. The disease is almost entirely confined to the lower grades of society where overcrowding and unhygienic surroundings are manifest.

There is a ratio of 4 males to 1 female which is related to the degree of exposure to contagion resulting from the economic situation in the larger towns. The age distribution after 15 years shows a slightly higher expectation, probably due to the effects of different exposures to infection. No cases were recorded in infants under a year old and from 1 to 15 they were relatively infrequent.

The lower incidence of the disease in the south may be ascribed to the smaller number of reservoirs of infection and to the shorter period of favourable conditions for the spread of the vector.

A marked alteration in the number of reported cases each year is observed and it is suggested that this may be due to the immunity from infection lasting for only a short period. E Hindle

COLES (Alfred C.) Observations on the Life-History of the Spirochaetes of Relapsing Fever—*Jl Trop Med & Hyg* 1936 Apr 1 Vol 39 No 7 pp 77-81 With 12 photomicrographs & 7 figs.

The author examined dried films of *Spirochaeta pallida* S ducleri, *S. deserticola*, *S. anserina* and also *S. buccalis* and other mouth spirochaetes stained in various ways and in all cases found evidence of the existence of small granules within the spirochaetes.

The air-dried films were fixed in alcohol and then stained in well diluted Giemsa for 12, 24 and 48 hours respectively. After washing and drying half the stained films were differentiated by dropping on a few drops of Orange tannin and after allowing this to act for 15 minutes the preparations were washed in water. The films were examined both with ordinary and dark-ground illumination. In addition Barri's Indian ink method was used and found to show the existence of beads or dots in all the spirochaetes examined.

The author concludes from his observations that spirochaetes consist of a tube containing minute granules and that under certain conditions the wall of the organism bursts and the granules are discharged.

These infective granules would be so small that they would be almost indistinguishable from other minute granules present in the blood and tissues.

[BALFOUR and the reviewer^{*} both described this process in the case of *S. senesca* nearly 25 years ago and the latter advanced a similar explanation of the so-called invisible infecting stage of spirochaetal infection (see this *Bulletin* 1912, Vol. 1, p. 34).] E. H.

VINCENT (R.), SECURY (P.) & DAUFRANE (M.). Technique d'isolation des spirochètes communaux de l'homme. [A Technique for the Isolation of the Common Human Spirochaetae].—C. R. Soc. Biol. 1930. Vol. 121 No. 5. pp. 406-408.

A modification of Noguchi's technique by means of which the authors have been able to isolate in pure culture various common spirochaetes from the human mouth, lungs, intestine and genitalia. The medium consists of one part of sheep serum mixed with three parts of nutrient agar the mixture then being placed in tubes 11 mm. in diameter and 22 cm. long each containing a piece of fresh sterile kidney from a guinea-pig, rabbit, or sheep. The nutrient agar is prepared as follows —

Meat extract (500 gm. in a litre of water)	1,000 cc.
NaCl	5 gm.
Agar	15 gm.

adjusted to pH 8.

This medium can be used immediately and also preserves its properties for a month.

The tubes are inoculated by means of a capillary pipette passed down the centre of the medium to the neighbourhood of the piece of kidney care being taken to avoid the formation of bubbles. The medium is then covered with a layer of sterile vaseline and kept at 37°C. About the 5th day or sometimes earlier subcultures are made. The selected tube is cut across about 2 or 3 cm. above the piece of tissue and then by means of a pipette a small cylinder of the medium is isolated from the region between the path of the inoculation and the wall of the tube. This material can be examined by means of dark-ground illumination and if it contains spirochaetes is mounted into a fresh tube in the neighbourhood of the kidney. This process is repeated indefinitely until the spirochaetes are separated from contaminating bacteria. Sometimes the process can be accelerated by passages in semi-coagulated serum containing kidney to which is added 2 to 4 drops of a 1 per cent. solution of malachite green in each tube. The dye retards the multiplication of the bacteria without affecting the spirochaetes.

The separation of spirochaetes belonging to different species is more difficult and both biological and mechanical methods have to be employed. Some spirochaetes grow faster than others, and also the medium can be modified in various ways, such as by altering the pH, omitting the sterile tissue using ascitic fluid instead of broth, etc. The mechanical methods follow the technique indicated by VARIAN for the isolation of anaerobic bacteria.

E. H.

SEGUN (P) & VINZENT (R.) Étude systématique des spirochètes buccaux d'après les caractères de culture. [A Systematic Study of Buccal Spirochaetes based on their Cultural Characteristics.]— C. R. Soc. Biol. 1938 Vol. 121 No 5 pp 408-411

The authors give the characteristics of the following species of buccal spirochaetes isolated in pure culture from the human mouth by the technique described above —

S microdentum Noguchi (1912) *S ambigua* n. sp. *S commandonii* n. sp. *S ekoliodonta* Hoffmann 1920 *S trimerodonta* Hoffmann 1920 and *S macrodentum* Noguchi 1912 (= *S tenuis* Gerber). They were unable to obtain a pure culture of *S buccalis* E H

LI YUAN Po Méthode de préparation simplifiée de mon milieu pour la culture du *Spirocheta recurrentis* [A Simplified Method of preparing my Medium for the Culture of *S. recurrentis*]—Ann Parasit Humaine et Comparée 1938 Jan 1 Vol. 14 No 1 pp 76-77

A modification of the original method of preparing this medium (see this *Bulletin* 1893 Vol. 30 p. 366) The yolk of an egg of which the shell is previously sterilized with alcohol is mixed thoroughly with 400 cc. of sterile 0.85 per cent. saline solution in a conical flask. The egg must be fresh and preferably with the shell of a dark brown colour. About 5 cc. of this mixture is added to each tube containing egg white coagulated at 80-85°C for twenty minutes. The tubes are kept at 56°C for two hours and then a layer of sterile paraffin is added. After cooling the tubes are ready for use in spite of their opacity. The medium has been found to give excellent results especially with *S. recurvans* and one can count on 100 per cent. success in cultures from human blood if the operation is conducted aseptically. For subcultures it is necessary to add one or two drops of citrated blood to each tube.

E. H.

ADLER (S) THEODOR (O) & SCHIEBER (H) Transmission of Relapsing Fever by Ticks in Palestine. [Correspondence]—*Lancet* 1936 Feb 22. p 448. Also in *Harefuah* Jerusalem. 1936 Mar Vol. 16 No 3 (57) [In Hebrew English summary p 11]

A recent investigation of a small outbreak of relapsing fever in Kfar Vitkin south of Hedera in the coastal plain, showed that all infections could be traced to a cave infested with *Ornithodoros papillifer*. Ticks collected in the cave readily transmitted spirochaetes to rats in the laboratory. This tick produces a local analgesia while biting and coxal fluid and faeces are not excreted during feeding. The transmission, therefore, is obviously by the bite, and the authors were able to demonstrate the presence of spirochaetes in smears made from the puncture wounds both of a human subject and a rat bitten by infected ticks.

E. H.

KOHLS (Glen M.) & COOLEY (R. A.) Notes on the Occurrence and Host Relationships of the Tick *Oreithodorus taylori* in Arizona.—Public Health Rep 1938 Apr 24 Vol 51 No 17 pp 512-513

Larval specimens of *Ornithodoros talaje* were collected on kangaroo rats (*Dipodomys* sp.) in an uninhabited region 40 miles southwest of (1315)

Aguila, Arizona, and nymphs and adults from soil removed from their burrows. Pocket-mice and jack rabbits in the same localities carried no ticks and therefore the authors suggest that in this region *O. aclypeata* may be distinctly limited in its host relationships. E. H.

LIESTEIN (I) Transmission de *Spirocheta woryi* par *Pediculus corporis*. Contribution à la technique de l'élevage des poux. (The Transmission of *Spirocheta woryi* by *Pediculus corporis*. Contribution to the Technique of rearing Lice.)—Ann. Parasit. Humaine et Comparée. 1936. Mar 1. Vol. 14. No. 2 pp 113-125 With 5 figs. on 1 plate. [23 refs.]

The author employs the usual leather "bracelet" method of feeding the lice contained in pill-boxes, but states that they live better if kept between meals in a glass jar over damp cotton wool in an incubator at 35°C during the night, and either at 24°C. or 35°C. during the day.

The lice were infected by feeding on the shaved ventral surface of a rat infected with *S. woryi*; but about 90 per cent. of the lice died after such a meal, animal blood being generally toxic to them.

The spirochaetes in the gut of the lice were found to become inviolate after about 3½ hours and soon disappeared. After 24 hours no trace of them could be found in the body of the lice.

Infected lice were ground up and inoculated into rats at varying intervals. They were found to be virulent 24 hours and 7, 8 and 9 days after the infective meal, but after 48 hours and 5 days were not virulent. It is curious that when the spirochaetes were inoculated directly from one rat to another the infection was always fatal, but the infections produced by the emulsions of lice were generally benign. E. H.

SERGENT (André) Passage dans le lait du spirochète de la fièvre récurrente hispano-africaine (souche algérienne). (The Passage in the Milk of the Spirochete of Spanish-African Relapsing Fever (Algerian Strain).)—C. R. Soc. Biol. 1936. Vol. 122 No. II. pp. 213-214

Four guineapigs were infected with an Algerian strain of *S. leggettii* and at the height of the infection their milk was collected and inoculated subcutaneously into a series of guineapigs, all of which developed the disease.

Although the infection was thus shown to be present in the milk of all four animals spirochaetes were never found in the milk by microscopic examination. Out of the seven young guineapigs which fed on this infected milk only one developed the disease after an incubation period of 14 days. E. H.

KÜHNER (Friedrich) Einige seltene Beobachtungen bei afrikanischen Rückfallfieber. (A Few Notes on African Relapsing Fever.)—Arch. f. Schiffs u. Trop. Hyg. 1936. Apr. Vol. 40. No. 4. pp. 160-165

The author gives two examples of intra-uterine infection with relapsing fever. In the first case the mother developed the disease the day after her child was born. The infant although healthy at birth and its blood negative 6 days later was found to be heavily infected with spirochaetes and in spite of treatment succumbed to the disease. In

the second case the infant was born of an infected mother and its blood remained negative but on the third day it became unwell and as a precautionary measure was treated with myosalvarsan. The following day the child was better and remained well and the author reasonably assumes that it had probably been infected at birth and the treatment arrested the development of the disease.

With regard to cases in which patients show recurrence of attacks within a few weeks of receiving a course of treatment the author adduces evidence to show that these must be regarded as new infections rather than examples of the development of salvarsan-resistant strains of spirochaetes.

Finally the immunity problem is briefly discussed and it is considered that treatment prevents the full development of any immunity against the infection but, nevertheless, it is generally inadvisable to delay treatment as occasionally the disease may be rapidly fatal.

E H

CALWELL (H. G.) A Case of Congenital Relapsing Fever—*East African Med Jl* 1938 Feb Vol 12 No 11 pp 347-348

The record of a case of infection with *S. duttoni* in a child, who developed the disease on the ninth day after birth and died on the 12th day. The mother showed symptoms of the disease on the third day of the puerperium and since the infant was not at any time exposed to the bites of infected ticks the infection seems to have reached the child either through the placenta or in some other way during parturition.

F H

SERGENT (André) Caractères pathogènes d'une souche algérienne du spirochète de la fièvre récurrente hispano-africaine [The Pathogenic Characters of an Algerian Strain of Spanish-African Relapsing Fever]—*C R Soc Biol* 1938 Vol. 12f No 14 pp 1520-1522.

An experimental study of an Algerian strain of *Spirochaeta hispanica* various animals were inoculated subcutaneously in order to determine their susceptibility to this infection.

The pig, donkey and cat were found to be refractory but the other animals tested were susceptible in varying degrees. The guineapig is regularly infected and always shows an acute febrile attack followed by a chronic state of infection. The rabbit 17 out of 18 infected shows a similar type of infection to the guineapig but the parasites are present in the blood for a shorter time and in fewer numbers. The white mouse becomes infected after 24 hours incubation but the attack is of short duration and the animals recover. Monkeys showed an attack of 4 to 5 days and in 1 out of 3 cases there was a relapse 10 days later which lasted for 5 days. Five out of 6 dogs were infected two young ones showed spirochaetes in the blood for 2 and 7 days respectively the adults showed latent infections. The fowl is also susceptible but shows no obvious spirochaetes in its blood. Nevertheless its blood becomes infective to guineapigs after about 5 days incubation and this infectivity persists for about 3 weeks.

E H

SERGENT (André). Épreuve de la prémunition croisée appliquée à quelques souches algériennes de spirochétose hispano-africaine [Cross-Immunity Tests applied to Various Algerian Strains of Spanish African Relapsing Fever].—Bull Soc Path Exot. 1938 Mar 11 Vol. 29 No. 3 pp. 245-251 With 2 figs.

The author made cross-immunity tests with 3 Algerian strains of *Spirochaeta hispanica* in guineapigs. One strain had been isolated from a human case of infection at Chiffalo a second from *Rhipicephalus sanguineus* in the same locality and both strains had been kept in the laboratory for two and a-half years. These two were found to be serologically identical. A third strain, isolated from a human case in another district only 3 months previously, belonged to the same species, but was more virulent. E. H.

SERGEANT (André). Emploi thérapeutique du sérum de convalescence de fièvre récurrente hispano-africaine. (Étude expérimentale) [The Therapeutic Use of Convalescent Serum in Spanish-African Relapsing Fever An Experimental Study].—Bull Acad MH 1938 Mar 17 100th Year 3rd Ser Vol. 115. No. 11 pp. 463-467

The author has studied the value of convalescent serum both for protection and treatment using guineapigs infected with *Spirochaeta hispanica*. This is an ideal animal to use for out of 1100 guineapigs inoculated with this strain, not one has been refractory to the infection.

In one series of experiments 5 cc. of convalescent serum was injected into guineapigs either the day before the same day or the day following the inoculation of spirochaetes. In all three groups the serum prolonged the incubation period and attenuated the attack, but on the other hand the infection was prolonged with many small relapses.

With regard to the curative action, out of 71 infected guineapigs 25 were left untreated and the remaining 46 inoculated with convalescent serum either the first, second, third or fourth day of the attack. In all cases the serum caused a sudden fall in temperature and the number of parasites within 24 to 36 hours. The effect was most marked on the third day of infection when the average density of spirochaetes in the blood was reduced to an average of only 1.5 sept. as compared with 8 days in the controls.

Convalescent serum collected from guineapigs after the end of the first attack was found to be more effective than after several weeks. The action was found to be proportional to the dose injected and better results were obtained by giving a single large dose, than a number of small doses. E. H.

From these results the author is of the opinion that human cases of this disease should be treated by means of convalescent serum, for this infection does not respond to arsenical treatment and the disease is often serious, with many relapses.

RESSELER (R.). Action thérapeutique de la chrysoblose dans la spirochétose de Dutton chez les souris. [The Therapeutic Action of Chrysoblose on Spirochaeta duttoni in Mice].—Ann Soc Belge de Med Trop 1935 Dec. 31 Vol. 15. No. 4 pp. 541-549

The description of the action of a new gold compound, Chrysoblate, prepared by the Union Chimique Belge, which whilst considerably less

toxic than solganal and soganal B [see this Bulletin 1932 Vol. 29 p 563] possesses a similar therapeutic index 1:50 against *S duttoni* infection in mice. The author recommends its use for the treatment of African tick fever.

E H

VAUCEL (M.) Le séro-diagnostic de Martin et Pettit au Tonkin (résultats de 800 séro-agglutinations) [Martin and Pettit's Serum Diagnosis at Tonking (the Results of 800 Serum Agglutination Tests)]—*Bull Soc Path Exot* 1936 Mar 11 Vol. 29 No 3 pp 251-257

Although since 1934 only 4 cases of Weil's disease have been diagnosed at the Tonking hospital the results of serum agglutination tests suggest that infection with *Spirochaeta icterohaemorrhagiae* may be much more common than is generally supposed.

The patients showing characteristic symptoms all agglutinated in dilutions of 1:10,000 to 1:12,000. 193 patients in which the disease was suspected gave positive agglutinations in 10 cases with average dilutions of 1:1,800. 252 sera of patients with undetermined febrile infections gave 7 positive results with average dilutions of 1:1,300. 297 sera forwarded for Wassermann tests gave 13 positive results with average dilutions of 1:930. 54 sera from cases of pyomyositis gave 12 positive reactions a result which is considered to suggest that leptospiral infection may play some part in the aetiology of tropical myositis.

The sera of 15 dogs gave uniformly negative results. E H

MEYER MAY (J.) & VAUCEL (M.) La spirochèteose ictero-hémorragique est-elle responsable de certaines myosites tropicales. [Is Spirochaetal Jaundice responsible for Certain Tropical Myosites?]—*Bull Soc Path Exot* 1936 Mar 11 Vol. 29 No 3 pp 257-263

A detailed account of the results of agglutination tests against *S icterohaemorrhagiae* of the sera of 54 cases of tropical myositis of which 12 were positive [See above.] E H

MARTIN SANCHEZ (Antonio) Las espiroquetosis humanas en las Islas Canarias. Espiroquetos en esputos orina y sangre A propósito de quince observaciones [Human Spirochaetosis in the Canary Islands.]—*Medicina Páginas Calidos* Madrid 1936. Mar Vol. 9 No 3. pp 105-124 With 7 figs. [38 refs.]

The author describes and gives brief clinical notes of 14 patients who were found to have spirochaetes either in their sputa, the peripheral blood or the urine or in more than one of these. Their presence in sputum had been previously noted but otherwise these cases are claimed to be the first recorded in the Canary Isles. Jaundice was present in 3 only fever was not found in 5. The most common symptom was pain, in the abdomen or over the liver varying in degree it was complained of in 12 of the 14. Spirochaetes were found in the circulating blood in 10 in the sputum in 8 in the urinary deposit in 6 in all three in one patient in blood and sputum in 6 in blood and urine in 4. The subjoined table adapted from the original shows clearly the combination of symptoms and signs present in each patient and its reproduction here will render any detailed clinical account unnecessary. The local

rats were found to harbour *Sp. microhaemorrhagiae* and some of these 14 cases were instances of Well's disease possibly contracted indirectly from these animals.

H H S

Symptom	Cases													
	1	2	3	4	5	6	7	8	9	10	n	12	13	14
Jaundice	•					•				•				1
Fever	•					•				•				1
Pain	•	•	•	•	•	•	•	•	•	•	•	•	•	12
Exophthalmos	•	•	•	•	•	•	•	•	•	•	•	•	•	24
Urticaria														4
Hepatosplenomegaly							•							13
Splenomegaly							•							11
Spirochaetes in excretions	•	•	•	•	•	•	•	•	•	•	•	•	•	11
Spirochaetes in circulating blood	•	•	•	•	•	•	•	•	•	•	•	•	•	10
Spirochaetes in urinary deposit			•	•	•	•	•	•	•	•	•	•	•	11
Blood not examined for spirochaetes				•	•	•	•	•	•	•	•	•	•	13
Spirochaetes found in association with T.B.					•									6
Microfilariae found in association with P. brasiliense									•					11
Spirochaetes not found										•				11

Chart of symptoms of 14 patients with spirochaetosis in the Country (Illustrating MARTIN'S SANTORI paper from *Medical Parasitology*)

PRETO (Giacomo). A proposito di un bambino portatore di leucose dell'utero emorragico. [Well's Disease in a Child.]—*Parasitologia* 1936, Apr 15, Vol. 28, No. 534, pp. 171-180. With 2 figs & 1 chart. [30 refs.] English summary (8 lines).

The patient was a boy of 8 years. No history was obtained except that three years before he had suffered from "haemorrhagic nephritis following impetigo" and was cured after two months treatment. The present illness started two days before he came to the clinic, with fever 39°-40°C., headache, efforts at vomiting, and diarrhoeic stools 8-10 in the day. The liver was enlarged to 2 cm. below the costal margin. The urine was clear with a slight trace of albumen. Blood culture was negative; ascaris ova were seen in the faeces. There was a profuse epiphora on the second day in the clinic, the temperature fell to normal on the sixth day. There was no jaundice. Examination of the ureter

KNOVLES (R.) DAS GUPTA (B. M.) & SEN (S.) Natural Spirochaetes infection in White Mice.—*Indian Med. Gaz.* 1936, Apr. Vol. 71 No. 4 pp 210-212. With 1 chart & 1 fig.

An examination of 31 white mice originally received from the Central Research Institute, Kasauli, and subsequently kept under conditions precluding the possibility of any rat reaching them resulted in the discovery that 15 or 48 per cent. showed natural infection with *Spirillum murorum*. The strain was isolated and shown to be pathogenic to man by inoculating a volunteer who subsequently developed rat-bite fever.

This observation shows that the white mouse may not be a suitable animal for blood inoculation in testing for *Spirillum murorum* and the guinea-pig may be more suitable for no infection was found in the first 20 individuals examined.

E. H.

STROESCO (G.) Le mode de transmission et de propagation de la spirochétose provoquée par le *Spirochæta muris* son organotropisme. The Method of Transmission and Spread of Spirochætosis caused by *Spirochæta muris* its Organotropism).—*C. R. Soc. Biol.* 1936, Vol. 121 No. 7 pp. 819-821. With 2 figs.

An examination of the urino-genital glands of male and female mice infected with *Spirillum murorum* by means of Dieterle's suspensions method, has shown that these organisms have a preference for the vesiculae seminales and Bartholin's glands. The examination of 21 males and 8 females showed massive infections of these organs, up to as many as 100 spirilla in each microscopic field in the case of the older animals. The organisms occur not only in the contents of the vesiculae seminales but also in the glandular cells of the walls. Other parts of the genital system remain negative. In females, Bartholin's glands are always positive and the infection is often present in the per-glandular tissue, especially in lactating individuals. During lactation the spirilla leave Bartholin's glands and by means of the blood system reach the mammary glands where they multiply and can infect newborn animals (see this *Bulletin* 1934, Vol. 31 p. 835). The infection can also be transmitted during copulation.

In view of the predilection of *S. murorum* for these glands, their secretion seems to offer an optimum medium for their culture : E. H.

MOYREL (R.) & TROVO-VAN-QUEZ. Traitement du sodeka par les sels de bismuth. The Treatment of Sodaka by Bismuth salts.—*Bull. Soc. Path. Exot.* 1936, Jan. 8, Vol. 29 No. 1 pp. 31-35.

The authors have treated two cases of this disease by means of injections of Bivatol and both were completely cured after four intramuscular injections at intervals of 3 to 4 days. A third case, also an Annamite had been treated by intravenous injections of novarsenobenzol, up to a dose of 0.45 gm. but the course did not prevent a relapse which developed ten days after completion of the arsenical treatment. A course of Muthanol was given which at once arrested the development and effected a complete cure.

The authors recommend the use of these bismuth salts, in place of arsenicals, as being more convenient and less dangerous than treatment by novarsenobenzol. Moreover they seem to be more efficacious.

E. H.

DYSENTERY

AMOEBIC

SECKINGER (D L) The Epidemiology of *Entamoeba histolytica* Infection in Two Rural Georgia Counties.—*Southern Med Jl* 1936 May Vol. 29 No 5 pp 472-477 [23 refs.]

The area investigated lies about 50 miles north-east of Atlanta City in Barrow and Walton Counties. The enquiry started in the town of Bethlehem in which dwell 42 families all white. Water is obtained entirely from surface wells. sewage disposal consists of open privies flies are abundant and houses are not screened. Among the 117 residents one active case of dysentery and 13 cyst passers were detected all but one was discovered at the first examination so the infection rate is at least 12 per cent. Cases in Bethlehem started after the immigration of two women who had contracted infection outside the previous year. The area of enquiry was therefore extended. In Barrow County 332 individuals in families giving a history of dysentery were examined and 66 or 20 per cent were passing *E histolytica* 12 or 8.2 per cent in vegetative form and the others the cystic. In Walton County 73 were positive out of 189 or 38.6 per cent. Thus in these two counties and excluding Bethlehem 129 were positive among 521 persons examined. Nearly one third 40 were in the 5-14 year group. In many instances there was more than one infected in a family. In 31 families in Barrow County 74 persons were positive and 88 in 38 families in Walton County. In one large family of 11 persons only one was negative a child of 3 years. Further investigations showed that the family food handler was at times the source of the spread but a very potent factor was contamination of food by flies.

H H S

KOITER (D) Mededeeling uit de praktijk [Amoebic Dysentery in a Dog]—*Nederl Indische Bladen v Diergeneesk* 1936 Apr Vol. 48 Nos. 1 & 2 pp 87-89 English summary (5 lines)

A dog in Bandoeng was observed to be passing stools containing blood and mucus. Faecal examination revealed abundant Trichomonas but no hookworms. A specimen however sent to the Pasteur Institute was reported to contain a few ancylostome ova, very many Trichomonas and numerous vegetative forms of Entamoeba. It was treated with emetine hypodermically and by Yatren 125 mgm. and rivanol 10 mgm by mouth thrice daily and was cured. This is said to be the first certified case of amoebic dysentery in a dog in the Dutch East Indies.

H H S

WAGNER (Oskar) Experimentelle Untersuchungen ueber Amöbenruhr I Teil. Krankheitsverlauf bei künstlicher und spontaner Uebertragung der Amöbiasis im Versuchstier [Course of the Disease in Experimental Amoebic Dysentery]—*Beihete z Arch f Schiffs u Trop Hyg* 1935 Vol. 39 No 1 pp 1-48 (1-48) With 6 figs. [84 refs.]

BIELING (Richard) Experimentelle Untersuchungen ueber Amöbenruhr II Teil. Die experimentell erzeugten Veränderungen

und die Pathogenese der Amöbiase [Pathology of Experimental Amoebic Dysentery]—*Ibid.* No. 2 pp. 49-108 (1-60). With 29 figs. [49 refs.]

These two papers describe the results of investigations carried out at Frankfurt on a strain of *Entamoeba histolytica* which was isolated in Hamburg from a case of human amoebiasis by rectal inoculation of a kitten. The strain was maintained for a period of 8 years during which several thousand cats and several hundred dogs were infected. The work was undertaken primarily with the object of carrying out therapeutic studies on amoebic dysentery but the very large series of animals used has enabled conclusions to be drawn regarding the susceptibility of animals, the variation in virulence of the amoebic stock, the pathology of experimental infections and a number of other important questions relating to the dysentery amoeba.

The first paper deals with the experimental side of the subject. It is noted that the routine method of infecting animals was by the injection into the colon, through a rubber rectal tube, of saline washings from the large intestine of an infected animal. The washings were obtained by injecting and withdrawing warm saline solution by means of the tube and syringe apparatus. Owing to the failure of some animals to become infected at the first injection, in spite of abundance of amoebae in the material used, it is necessary, in order to avoid losing the strain, to inoculate several animals at each passage. There were very marked differences in the type of infection produced, which varied from the acutest form of dysentery to a purely carrier condition. If the number of animals used had been small it would have been possible to interpret these differences as due to changes in virulence in the stock of amoeba employed. It became clear however as the work proceeded that the virulence had remained unchanged and that the differences noted were due to variations in the susceptibility of the animals. Young animals were generally more susceptible than old ones, amongst which occurred cases of infection without symptoms, in which only small amoebae ("minuta" forms) without included red blood corpuscles were to be found. Injection of these "minuta" forms into other animals capable of giving rise to severe dysentery associated with the presence of large amoebae with included red blood corpuscles, of the typical *E. histolytica* type. Young dogs were as a rule, more susceptible to rectal injection than cats though kittens under 1,000 grams in weight never failed to acquire a fatal infection. With increase in age and weight the susceptibility decreased more rapidly in the case of dogs than in the case of cats. Over a period of 8 years it was noted that the susceptibility of the animals was generally higher during the hot summer months than during the winter, a feature which appears to be correlated with the recognized greater severity of human amoebic infections in hot countries. Such seasonal fluctuations in the susceptibility of the animals emphasize the difficulty there is in attempting to establish distinct species of dysentery producing amoebae, such as *E. dysenteriae* on biological grounds alone.

Some evidence was obtained that in cats after two or three separate infections a certain degree of immunity was produced. In dogs there was little indication of such an acquired immunity as these animals appeared to be more liable to repeated infections than cats. Amoebic abscess of the liver with or without associated bacterial or trichomonas infection, was fairly common in cats but occurred only once in the dog.

Repeatedly it was observed in dogs that the infection of the large intestine induced by rectal injection of infective material spread to the small intestine while in two instances amoebae were found in the stomach associated in one of the cases with gastric ulceration. Occasionally dogs but never cats became infected accidentally by contact with infected animals. It was found that typical acute amoebiasis could be produced in both cats and dogs by feeding them with amoeba-containing material from such spontaneously infected animals. In general cats and dogs could be readily infected by introducing cyst free material from rectally infected cats and dogs into the stomach through an oesophageal tube. In these cases the infections induced were typical ones of the large intestine. Both cats and dogs were infected by administering orally cysts from human cases but with much longer incubation periods than was the case when amoebae were injected directly from animal to animal.

The second paper deals with the pathology of the experimental infections in cats and dogs and is illustrated with a number of photographs showing the condition of the intestine and the lesions produced. In a series of 695 cats in which infection followed a single rectal injection one third showed amoebae in the faeces after an incubation period of two days while three days later the great majority of the animals were passing amoebae. In a few of the animals there was a longer incubation period up to 20 days and in these cases it is noteworthy that when well established the disease was as severe as in animals showing an incubation period of only two days. Except in the case of a few of the larger animals death occurred in a few days. Following both rectal and oral administration of infective material two points of the large intestine are first attacked namely the lower part of the large intestine immediately above the anal ring and the region just below the ileo-caecal valve. This primary localization applies both to cats and dogs. It is interesting to note that after the administration of certain dyes the staining of the mucosa is most intense at these two points an indication that it is here that stasis occurs. The first change in the intestine is the appearance of small punctiform haemorrhagic necrotic areas. These gradually extend and become confluent. It would appear that the amoebae which accumulate and even reproduce at the two sites mentioned give rise to a substance injurious to the mucous membrane. The superficial epithelium including the distal part of the crypts is thrown off leaving exposed both the openings of the crypts and the intervening connective tissue. Amoebae appear to enter the tissues in three ways. They pass directly into the exposed connective tissue, into the crypts or into the opened up lymph channels whence they migrate to the lymph follicles and the sub-mucosa. Lodged in the tissues or in the crypts the amoebae multiply and by virtue of a poison or toxin produce zones of necrosis which increase in extent and unite with other similar zones. The intestinal mucosa responds to the invasion by the increased production of mucus which mixed with blood, forms an excellent medium for the development of amoebae on the surface of the intestine. This mucus, spreading over the mucosa leads to fresh invasions and ultimately it may be to amoebic necrosis of the entire surface of the mucosa of the large intestine. In cats the ileo-caecal valve forms a definite barrier to extension of the invasive process but in dogs this is not so for infection of the small intestine in varying degree is of common occurrence.

During their development in the tissues the amoebae bring about destruction of lymphatics and capillaries with the result that amoebae may enter these vessels and make their way to the lymphatic glands and the liver. In sections of the liver the amoebae can sometimes be seen in the capillaries. By multiplication and toxin production a coagulation necrosis of the liver tissue is produced, leading to the characteristic liver abscess. It is noteworthy that though the tissue necrosis evidently results from the local action of a poison or toxin elaborated by the amoebae it is not very evident that this toxin has more than a purely local effect for dogs which have had extensive involvement of both the large and small intestine have during the course of some weeks shown no symptoms of generalized toxæmia. Though the course of infection in dogs is very much the same as in cats, in the involvement of the mucosa is generally more superficial, while the characteristic of these animals is the production in the large intestine distinct ulcers clearly separated from one another by relatively healthy mucosa. In consequence of the more superficial nature of the infection in dogs passage of the amoebae into the blood vessels and production of liver abscess are less commonly observed than in cats. As the disease in dogs is less acute than in cats, spontaneous recovery is more common, though as in cats, relapses may occur. In spite of the fact that symptoms of general toxæmia are not evident there undoubtedly occurs some absorption of toxins for a condition of allergy is developed in dogs which have suffered from chronic infections. This is made manifest by the specific skin reaction following injection of amoebic antigen prepared from the heavily infected mucosa of a cat or dog. An emulsion of the mucosa is digested for about 5 weeks with *Bacillus proteolyticus* with a view to destroying the protoplasm. The resulting digest is centrifuged after the addition of formalin 0.02 per cent. when a clear solution having antigenic properties is obtained. The skin reaction takes the form of a rapidly developing nodule surrounded by a red area. In cats it was not possible to obtain the reaction probably because the disease in these animals is not of sufficient duration. Whether the test and complement fixation will prove to be of use for the diagnosis of human infections future work alone will show. Such are a few of the many interesting points brought out by this extensive and carefully conducted investigation on experimental amoebiasis in animals. The two papers should be carefully studied by all those who contemplate embarking upon similar work.

C. M. WOOD

KUBO (Michio) Investigations on Amoebic Dysentery. IV. Experimental Studies of Amoebic Dysentery in Dogs. (Second Report) Amoebic Dysentery of Dogs in Chronic Stadium and the Significance of Dogs in the Spread of this Disease.—*Jl. Orientol. Med.*, 1936, Apr., Vol. 24, No. 4. [In Japanese pp. 739-755. With 5 figs. on 1 plate. [45 refs.] [English summary pp. 47-48]]

Examination of 85 street dogs caught in Mukden showed 7 of them to be infected with *E. histolytica* and 2 were cyst-passers. Dogs selected experimentally were examined at intervals of 11 to 40 days after infection i.e. in what was regarded as the chronic stage [though this appears to have been arbitrarily selected]. Some were then passing typical dysenteric stools containing blood and mucus, others had stools apparently normal but with small quantities of mucus in which the amoebae

could be seen. Post mortem examination showed of course in the acute stage erosions and ulcers these were sometimes visible in the chronic stage, but some showed no macroscopic lesions. Amoebae might be found in the lumen without indications of invasion of the gut wall.

H H S

CARBONELL Y SALAZAR (A.) & SANCHEZ SANTIAGO (B) Absceso hepático de una niña de catorce meses. [Liver Abscess in a Child of Fourteen Months.] *Archivos Med Infantil* 1936 Apr May-June. Vol. 5 No 2 pp 143-151 With 4 figs. [13 refs.] English summary

The child a little girl of 14 months had been suffering 20 days prior to admission to hospital from dysenteric symptoms diarrhoea and passage of blood and mucus with high fever. These symptoms improved but the general condition did not and a swelling in the mid axillary line at the level of the base of the right lung called for prompt admission. X ray and puncture with withdrawal of greenish yellow fetid pus confirmed the suspicion of abscess. The swelling could be completely reduced by steady pressure. Operation was performed and the child recovered. Repeated examination failed to reveal *E histolytica*. Gram-negative bacilli and Gram positive diplococci were found and the abscess appeared to arise via the portal radicles but the actual causal organism was not determined.

H H S

MOTTA (Orlando Cabral) Abcesso amebico do pulmão [Amoebic Abscess of the Lung]—*Brasil Medico* 1936 Apr 4 Vol 50 No 14 pp 294-299 With 4 figs & 1 chart. [10 refs.]

The patient was a woman of 28 years. Some time before [how long is not known with certainty] she had suffered with dysenteric symptoms—colicky pain diarrhoea, passage of blood and mucus. When she came under the author's care she presented signs and symptoms of abscess of the right lung shown to be amoebic. The radiograms showed that the lower part of the lung was not affected there was a zone of normal lung between the diaphragm and the lower limit of the abscess. Emetine was given by intramuscular injections and also 10 cc. ampoules of 10 per cent. hyposulphite of sodium daily 20 cc. of 50 per cent. hypertonic glucose twice daily and neosalvarsan all intra venously. Death occurred suddenly 23 days after admission. [No operative measures are reported.] From the situation of the abscess the author concludes that the entamoeba did not pass from the liver via the diaphragm, but by the vascular route. If a post mortem examination was made there is unfortunately no account of the findings.

H H S

BASSLER (Anthony) Intestinal Obstruction due to Amebiasis.—*J Amer Med Assoc* 1938 June 6. Vol 108 No 23 pp 1965-1968. With 3 figs [12 refs.]

The patient a man of 50 years complained of abdominal cramps and occasional passage of blood after taking laxatives. Sigmoidoscopic

examination revealed inflamed areas and vegetative forms of *E. histolytica* were found. The amoebae disappeared after the patient received chiniosfon and he gained 30 lbs. in weight. Cysts were seen occasionally afterwards and 8 months later symptoms returned and the amoebae were again present. Treatment by carbamone and later by violet again was followed by improvement, but a year later he had complete intestinal obstruction with faecal vomiting necessitating urgent operation and an "annular neoplasm" was reported at the rectosigmoid junction. Caecostomy was done and 5 weeks later this wound became inflamed and started to slough and amoebae were found in the edges of the wound. The time from infestation to complete obstruction was 22 months.

Other authors have reported neoplasms of amoebic origin or inflammatory masses secondary to amoebic ulceration, and due to secondary bacterial invasion in many cases. The lesion in the present writer proved to be entirely intra-enteric and cleared up on prolonged amoebic treatment by violet, emetic carbamone and thiodine by mouth and by enema through the colostomy wound. H H S

GOLDB (Meyer). Oxygenation in Relapsing Amoebiasis. Report of Case—Jl Amer Med Assoc. 1936. May 18. Vol. 106. No. 21 pp. 1725-1726.

Felsen in 1931 advocated a process of intestinal oxygenation for treatment of ulcerative colitis. The patient whose case is recorded here suffered from amoebic dysentery and to all appearances recovered after treatment with emetine and arsenicals. Two and a half months later the symptoms returned and in a severe degree. Entamoeba cysts were found but no vegetative forms and the condition proved resistant to various methods of treatment and the patient was rapidly going downhill. The author regarded the case as one of "secondary ulcerative colitis" based on a mucosa made vulnerable by the amoeba, an environment in which even normal colonic dwellers, saprophytic, become virulent and pathogenic." Oxygen was administered for sessions in the dosage shown in the attached table during the hours 8 a.m. to 8 p.m., the dosage and frequency being governed by the tolerance of the patient. Castor oil was given at night and seemed to enable the patient to tolerate better the distension caused by the oxygen. Improvement was rapid, the patient leaving hospital on August 1st less than 3 weeks from the start of the oxygenation. H H S

Oxygenation Administered.

Date	Minutes	Bubbles per minute
July 23 1935	180	50
24	180	50
25	240	50
" 26	120	50
" 27	180	50
" 28	180	50
" 29	240	50

Total 21 33 hours

Approximately 64 liters.

BACILLARY BALANTIDIAL GIARDIASIS

WILSON (D A O) An Outbreak of Dysentery due to *B dysenteriae* Flexner Type P288.—Jl Roy Army Med Corps 1936 Mar Vol 66 No 3 pp 191-192. [Summary appears also in Bulletin of Hygiene]

In June of last year among 43 men of the Indian platoon of the 1st Battalion the K R.R.C. stationed at Mingaladon [the paper does not state where in India Mingaladon is situated and the name is not mentioned in the Times Atlas] 9 were attacked with dysentery one British soldier was also infected. Six of the cases were mild, but the symptoms were typical and 4 were of moderate severity. An organism giving the biochemical reactions of *Bact dysenteriae* Flexner was isolated from all and in 8 of them in almost pure culture. It rendered glucose mannite and dulcite acid, without gas production. It was however not agglutinated by the classical' Flexner antiserum but with subgroup B antiserum and in low titre (1 : 25) with subgroup A 2 antiserum with one exception. Subcultures of all the strains were sent to the Meerut laboratory where they were identified as Type P288. BOYD J S K described it in 1932 [see Bull of Hyg 1935 Vol. 10 p 124] and the evidence in favour of its pathogenicity is strengthened by the facts that it was isolated in every case, was present in many in almost pure culture, and agglutinins against it were found in the serum of one of the patients.

The author states that the source of the outbreak was not discovered but he makes a fairly shrewd guess in saying that the Indians latrine was only 6 yards from the door of the cook house that the soil outside was probably contaminated by the men washing at a tap after defaecation and that the cooking utensils were cleaned with sand from this area. The outbreak which occurred from the 4th-16th June ceased as soon as the practice was stopped.

H H S

MURASHIMA (Tetsuo) An Epidemiological Observation of the Dysentery Epidemic which occurred in Kawasaki City.—Jl Public Health Assoc Japan 1935 Sept. Vol. 11 No 9 pp 1-5 [Summary appears also in Bulletin of Hygiene]

In January 1935 an explosive outbreak of dysentery occurred in Kawasaki City a town of 150,375 inhabitants contiguous to Yokohama. The previous incidence of dysentery was 1.1 per 10,000 and 4.5 for Yokohama. There are two water supplies a larger at Tode estimated for 100,000 persons and a smaller at Nakahara. Night soil is removed by contractors and used as fertiliser.

The first case was reported on 31st December 1934 thence on successive days 16, 143 and 112, after which notifications fell, but the total by the end of the month was 1,357 or 9.0 per thousand inhabitants. Of the total 32,685 households 1,108 were attacked. In 922 there was one case only in 135 two in 40 three, in 7 four in one there were 5 and in another 11 cases [these total 1,358]. Forty-eight of 87 districts into which the city is divided were attacked. The fatality rate was 22.7 per cent. among 2-year-old children 19.2 for the 3-year-old 22.0 for 4-year-old. More than one type of *Bact dysenteriae* appear to have been concerned, those mentioned are the Shiga the Nishiura and the Kawasaki organisms, but the latter are not further defined.

In a second section of the paper the mode of infection of 449 patients is mentioned. 160 were infected through food, 201 by water and 88 by contact. Bacteriological examinations of the water sources showed *Bac. coli* to be present in all and occasionally in the water supplied. Till the autumn of 1934 chlorination of the supply had been carried out but "was discontinued due to the breakage of tools." H.H.S.

YANG (I. N.) & SUYU (C. H.) A Report of Laboratory Examinations in a Dysentery Epidemic in Kiangsi with Special Reference to the Examination of Carriers.—*Chinese Med. J.* 1936, Feb. Supp. No. 1 pp. 275-279 [Summary appears also in *Bulletin of Hygiene*.]

Since 1928 there have been almost every year outbreaks of dysentery of an epidemic character in Kiangsi Province and particularly in the districts of Ningtu, Huichang and Hsingkuo. In the summer of 1934 cases numbered thousands and fatalities were many. In the hot month of 1934 and the first of 1935 a survey was made of 23 Army hospitals, field and base. There was practically no isolation of sick and wounded soldiers, and almost complete neglect of sanitation.

During the two months 2,674 samples of faeces were examined, only one examination for each patient. The method employed was the lactose fuchsin agar and the China blue rosanilic acid plates for isolation of organisms followed by agglutination with a Shiga and a mixed Flexner sera. Of the 2,674 1,008 were from dysentery patients and of these 146 or 13.7 per cent. were positive. 40 were excreting *Bac. dysenteriae* Shiga and 106 *Bac. dysenteriae* Flexner. Among 1,008 21 with other diseases, malaria, enteric fever etc., 112 or 10.3 per cent. were passing the dysentery bacteria, 42 Shiga and 70 Flexner. Among 277 healthy hospital orderlies 5.4 per cent. (15) were carriers, 3 Shiga, 12 Flexner while of 292 healthy students 21 or 8.0 per cent. were carriers 4 of Shiga, 17 of Flexner. Of the total examined, therefore, 294 or 11.0 per cent. were positive. 89 or 30.2 per cent. of the positive 3.3 per cent. of the total were passing the Shiga organism and 205 or 69.8 per cent. of the positive and 7.6 per cent. of the total, one of the Flexner group [in the text the figures are erroneously given as 7 of Shiga to 23 Flexner]. Clearly the condition of the Army hospital leaves much to be desired and the number of carriers among the apparently healthy is high. H.H.S.

NAVOKA (Josain R.) Dysentery Epidemic in Ra.—*Vahine Md. Practitioner* Suva. 1935 Sept. Vol. 2 No. 3 pp. 272-273.

This account of an outbreak of dysentery is of more than ordinary interest in that it is contributed by a Native Medical Practitioner qualified from the Suva Medical School. In the first four months of 1935 there were 85 cases admitted, 73 Fijians and 12 Indians, and 14 ended fatally a case mortality rate of 18.8 per cent. Thirty-seven (14 fatal) were children under 5 years of age, 15 (none fatal) between 5 and 12 years and 33 (2 fatal) above this age. The fatality was higher among the Fijians, 15 out of 73 or 20.5 per cent. but only one among the 12 Indians. Thirty-seven specimens of stools were sent to the Suva Laboratory and 9 were positive. In 8 the organism was *Bac. dysenteriae* Shiga.

The steps taken to deal with the outbreak are detailed and show that everything was done that was possible to prevent further spread. The treatment in hospital is detailed. Before being allowed to return to his village the patient is transferred to the convalescent ward and kept under observation for a week while taking full diet and having no treatment. Only if he remains well during this period is he given his discharge from the hospital.

H H S

SEKI (K) The Clinical Observation of the Ekiri and Dysentery of Children—Oriental Jl Dis Infants 1935 July Vol. 18 No 1 pp 8-10 [Summary appears also in *Bulletin of Hygiene*]

Ekiri is the name given in Japan to a disease showing certain points of resemblance to severe dysentery with toxic phenomena. Clinically states the author it is impossible to discriminate Ekiri from dysentery. The author analyses 382 cases observed by him in 3 years. Children are chiefly attacked many in the 2-5 years period it is commonest in the summer with a maximum prevalence in August. Fifty of the 382 died, a 13 per cent. fatality. Serious symptoms usually came on early often in 6 hours at most 36 and on an average 18 hours. The symptoms are feeble pulse marked cyanosis convulsions and coma with diarrhoea and passage of mucus blood and pus. Death occurred usually within 36 hours 40 died in 17 hours. In 84 patients convulsions preceded the other symptoms. Rise of temperature occurred at the onset but disappeared by the 5th or 6th day as a rule and might do so as early as the second day

H H S

TEN BOKKEL HUININK (A) Dysenterie bij kinderen. [Dysentery in Children.]—Nederl Tijdschr v Geneesk 1934 Aug 24 Vol. 79 No 34 pp 4051-4056 English summary (9 lines)

An account is given by the author of an illness of varying degree of severity occurring in four children of one family. One died within a short time of becoming ill. The second had symptoms of an acute toxic condition—sunken eyes torpor and weakness of pulse the third had one day's elevation of temperature but was scarcely ill, while the fourth had only a slight rise of temperature. All had too frequent stools without a true diarrhoea and the frequency had disappeared in a few days. A slight admixture of blood and mucus was only evident in two of the cases. This series is brought forward along with some other illustrative cases to show how Sonne dysentery for that bacillus was isolated from the stools can give rise to serious toxic symptoms or even prove fatal. This is quite a common experience in the Netherlands Indies although the affection is usually regarded as benign in Holland. "Stress is laid on the fact that in Holland in all cases of acute intoxication accompanied by fever even when no symptoms from the intestinal tract are present, the stool should be examined for dysentery bacilli.

W F Harvey

MANSON BAHR (Philip) The Differential Diagnosis of Diseases of the Colon (Dysentery and Colitis)—Lancet 1936 Apr 4 & 11 pp 759-765 830-834 With 12 figs. & 1 coloured plate.

The author very wisely allows himself considerable latitude in his interpretation of differential diagnosis and includes in his survey (see)

much valuable information on the aetiology and pathology of the diseases which may give rise to the symptom-complex of dysentery. Thanks to the investigations and teaching of the author and other workers, much of the ground covered is already familiar to those who are concerned with tropical disease.

The author protests against the practice of diagnosing amoebic dysentery on the sole evidence of the presence of Charcot-Leydig crystals pointing out that he has demonstrated these bodies in cases of intestinal coccidioidis, ulcerative colitis, and carcinoma of the rectum. He agrees, however, that when these crystals are present in large numbers, a prolonged search should be made for the dysenteric amoeba. *Giardia lamblia* is considered to be definitely pathogenic, in certain conditions, but the author keeps an open mind as regards the pathogenicity of other intestinal flagellates which, he points out, may be an added infection on top of amoebic or bacillary dysentery. This is true too of giardiasis in which condition a search, sometimes of necessity lengthy and repeated, may disclose an underlying amoebic infection. Ulcerative colitis is postulated as a systemic blood dyscrasia due to some unidentified specific infective agent the primary intestinal lesion being caused by excretion via the mucous membrane of toxic products. Another cause of dysenteric symptoms, less generally recognized than the foregoing, is an involvement of the rectum in lymphogranuloma inguinale which results in chronic inflammation and even stricture, a condition especially encountered in China.

These Lettomanian Lectures are comprehensive and essentially practical, and the clear picture presented will be of help in clearing up some of the existing confusion regarding the manifold causes which may produce the dysenteric syndrome.

W. P. Macleod

HIRSCH (H.) & ARROW (H.). Der heutige Stand der Lehre von der buhligen Dysenterie und ihrer Bekämpfung.—Reprinted from *Med. Welt*. 1935 No 12 10 pp

TEMPO (P.) & CASTORINA (G.). La balantidiosi nei bambini. [Infection of Children by Balantidium.]—*Pediatria* 1935. Apr 1. Vol. 43 No 4 pp 449-453. With 4 figs. English summary (2 lines)

From the district of Calabria in Sicily the authors report 4 cases of balantidiosis in children 5 to 9 years of age. Symptoms attributable to the dysenteric condition were present. In all cases a cure was effected by oral administration of arsenical combined with enemas of quinine specacuanha or thymol.

C. M. Ward

YERKES (Domingos). Algumas considerações sobre um caso de balantidiose intestinal e seu tratamento. [A Case of Balantidiosis].—*Brasil Medico* 1935. Dec. 7 Vol. 49 No. 49. pp. 1033-1094

A man 71 years of age, a pig-breeder had suffered with dysenteric symptoms for over 3 years. He passed 14 or more stools daily containing blood and mucus and was becoming very weak and emaciated. Examination of the faeces revealed *Balanidium coli* in large numbers, 6-7 per field. A new remedy Carobinase was tried this is a watery extract of *Jacaranda decurrens* administered, 25 gms. in 500 cc. hot

water as a rectal lavage. It has been recommended also for Giardia infection, administered by duodenal tube and by enteroclysis or vaginal douche for Trichomonas. After three weeks the patient's general state had greatly improved and *Balantidium* was no longer seen. Weekly examinations for five successive weeks continued to yield negative results and the author is convinced that definite cure has been accomplished.

H H S

BANIK (Lal Mohan) A Case of Dysentery caused by *Balantidium coli*—
Indian Med Gaz 1935 Oct. Vol 20 No 10 p 568

JOUCK (N) The Pathological Anatomy of Human Balantidiosis.—
Med. Parasit & Parasitic Dis Moscow 1935 Vol 4 No 3
[In Russian pp 239-243 With 6 figs.]

An account is given of the histopathology in three cases of human balantidiosis, all of which died shortly after admission into the hospital with symptoms of acute enterocolitis. The pathological changes observed are similar to those previously recorded C A Hoare

ATCHLEY (Floyd O) The Maintenance of a Strain of *Balantidium* in Laboratory Rats.—*Jl. Parasitology* 1935 June. Vol. 21 No 3 pp 183-185

GLASER (R. W) & CORIA (N. A.) The Partial Purification of *Balan-*
tidium coli from Swine—*Ibid* pp 190-193

In the first paper the author describes his micropipette method of introducing into a Ringer-serum-rice starch medium single specimens of balantidium from the faeces of the chimpanzee. With the pure-strain culture thus obtained rats were inoculated intracaeally by laparotomy and balantidium infection established. By inoculating the caecal contents intracaeally from rat to rat every three to six days the strain has been maintained for a year

In the second paper the authors record the culture of balantidia in semi-solid medium in V-shaped tubes. When material is inoculated at the top of one limb the balantidia pass in the course of 24 to 48 hours towards the other limb more rapidly than the contaminating bacteria so that by repeating the process several times with material pipetted from the other limb the culture can be largely purified of bacteria with the result that in subcultures the ciliates survive longer than they did at first subculture being only necessary every seven days.

C M IV

NELSON (E Clifford) Cultivation and Cross-Infection Experiments with Balantidia from Pig Chimpanzee, Guinea Pig and *Macacus rhesus*—*Amer Jl Hyg* 1935 July Vol 22. No 1 pp 26-43 With 1 fig [16 refs.]

Balantidia obtained from the caeca of recently killed pigs and guineapigs and from the faeces of the chimpanzee *Macacus rhesus* were introduced into the stomach of 81 rats which had been prepared for infection by placing them for 5 to 10 days on a 85 per cent. carbohydrate diet. The infection in the rats was controlled by daily

examination of the soft faeces which are passed. The balantidium from the chimpanzee and pig established themselves readily in the rat, one animal retaining the chimpanzee ciliate for 129 days and another the one from the pig for 499 days. No variations in morphology or conjugation cycle resulted from the life in the rat. The attempts to infect rats with *B. simile* of *M. rhesus* and *B. catarrhini* of the guinea-pig failed, as also did those to cultivate these ciliates in media which readily gave cultures of the ciliates from chimpanzee and pig. The ciliates in cultures were found to conjugate at a time of food abundance rather than at times of hunger

C. M. W.

GARALDOV (Arnaldo) *Balantidium coli*. Quantitative Studies in Experimental Infections and Variations in Infectiousness for Rats.—*Jl. Parasitology* 1935 Oct. Vol. 21 No. 5 pp. 388-392

Strains of balantidium from chimpanzees and pigs were studied in 296 experimental rats. It was noted that the strains varied greatly as regards their power of infecting rats and in the intensity of the infections when these occurred.

C. M. W.

CORRADETTI (Augusto) *Giardia entomiae* (Grassi, 1881), the Correct Name for the Giardia of Man.—*Jl. Parasitology* 1935 Aug. Vol. 21 No. 4 pp. 310-311

The author argues that as GRASSI in 1881 published a paper with the title "Di un nuovo parassita dell'uomo *Vaginomonas intestinalis*" the correct name of the parasite variously known as *Lamblia intestinalis*, *Giardia intestinalis*, *Giardia lamblia* etc. is *Giardia entomiae* (Grass, 1881)

C. M. W.

CALDER (Royall M.) & RICHARD (R. H.) Giardia Infestation of Gall Bladder and Intestinal Tract.—*Am. J. Med. Sci.* 1935 July Vol. 190 No. 1 pp. 82-83. With 2 figs. [10 refs.]

The case reported is that of a man who died in hospital from persistent diarrhoea after 16 years illness. Laboratory examination had revealed giardia in the stools and vomit. At autopsy a diffuse enterocolitis was found, with superficial ulceration in the colon. The gall bladder was normal in size and contained a brownish-black secretion. It is stated that "some of this secretion, before the gall bladder was opened, was found to be teeming with *Giardia* which, however, were not seen in sections. The paper unfortunately does not state exactly how the secretion was obtained from the gall bladder before opening, whether by syringe or by pressure through the duct or whether all possibility of contamination with duodenal contents was avoided. The relationship of the flagellate, whose habitat is the duodenum and upper part of the small intestine, to the lesions of the colon is not clear

C. M. W.

DIBOLD (H.) Zur Behandlung der Lambliose intestinale. [Treatment of Infestation by *Lambnia intestinalis*.]—*Med. Klin.* 1935 June 21 Vol. 31 No. 25 pp. 815-817

The paper concludes that *Giardia intestinalis* is definitely pathogenic and that its eradication depends as much upon the administration

of drugs which may act directly on the organism as upon the treatment of the special organs—gall bladder liver pancreas intestine—to which the symptoms of any particular case direct attention. C M W

CAMPONOVO (Luis E) Las puretrinas como tratamiento de las parasitosis intestinales. Nota previa. [Pyretrines in the Treatment of Intestinal Parasitism.]—*Prensa Med Argentina* 1935 Dec. 4 Vol. 22. No 49 pp 2371-2372.

The uses of pyrethrum or pellitory (*Chrysanthemum cinerariaefolium*) have an interesting history. Apart from its known insecticide properties in powder or infusion some 80 years ago it was used in powder form in the Caucasus for expulsion of *Enterobius* and 4 years later the infusion was used *per os* and *per rectum* for *Ascaris* infestation. In 1924 the combined active principle of the flowers was isolated by STAUDINGER and RUDZICKA. This proved to be toxic to cold blooded animals but harmless for man and warm blooded animals.

The author made trial of this in cases of Lambasisis some of which had resisted all the usual modes of treatment stovarsol, treparsol neosalvarsan in high doses yatren methylene blue naphthalene and jacaranda. He gave a 0.5 per cent strength in oil in doses of 5 mgm. twice daily by mouth and by rectum. In obstinate cases he gives 60 drops of this solution in oil [?] emulsion] in 25 cc. of distilled and sterilized water [why sterile?] Of 20 cases treated 12 were negative for periods of examination up to three months and 8 of them were negative after 4 days treatment. H H S

HEGNER (Robert) & ESKRIDGE (Lydia) Susceptibility and Resistance of Rats to Infections with Trichomonad Flagellates from Rat and Man.—*Amer Jl Hyg* 1935 Sept. Vol. 22. No 2. pp 307-321

— & — Absence of Pathogenicity in Cats infected with *Trichomonas felis* from Cats and *Trichomonas hominis* from Man.—*Ibid* pp 322-325

Trichomonas from kittens infected experimentally with *T. hominis* or *T. felis* did not support either from clinical symptoms or post mortem appearances the view that these trichomonads can be pathogenic to kittens. It was shown that clean cats associating with infected ones might contract an infection. It was also proved that carbarsone was effective in eliminating trichomonas infection from cats.

C M W

CICCHITTO (Angelo M) Dissenterie miste da *Entamoeba coli* *Blastocystis galini* e da *Blastocystis galini*-*Trichomonas intestinalis*.—[The Effect of Blastocysts in Conjunction with Protozoa in Production of Dysenteric Symptoms]—*Polclinico Sez. Prat* 1935 Aug 26 Vol. 42. No 34 pp 1671-1679 With 2 figs. [41 refs.]

Writing of *Blastocysts* in the human intestine the author expresses the opinion that this organism, harmless when alone may produce a type of dysentery when associated with *Entamoeba coli* or *Trichomonas hominis*

C M W

GABALDON (Arnaldo) Carbarzone Its Action on *Trichomonas hominis* and on Rat Trichomonads in Vitro.—*Amer Jl Hyg.* 1935. Sept. Vol. 22. No. 2. pp. 326-338. With 2 charts.

Carbarzone diluted in culture fluid at a concentration of 0.3 per cent. was lethal to both *Trichomonas hominis* and a rat trichomonad in less than 72 hours. In weak solutions (0.05 per cent.) the drug retarded the development of the flagellates in culture. C. M. W.

MASERO (Achille) Contributo allo studio della metadibenzidina.—*Ann. d. Med. Vene e Colore* 1935. Sept.-Oct. 41st Year Vol. 2. No. 3-4 pp. 611-651. With 4 figs. [100 refs.]

MISCELLANEOUS

CLEMENTS (F. W.) A Medical Survey in Papua Report of the First Expedition by the School of Public Health and Tropical Medicine to Papua, 1935.—*Med Jl Australia* 1936. Apr 4 23rd Year Vol. 1 No 14 pp 451-463 With 10 figs. & 2 maps. [12 refs.]

In 1912-13 BREINL made a survey of the coastal belt of Papua and described the forms of disease he found [see this *Bulletin* 1914 Vol. 4 p 407]. The work undertaken by the present expedition was a village to village survey of an area in the western portion of the Central Division of Papua the object being to obtain factors of health and disease amongst a virile vigorous people living in a well populated area. In two months 400 miles were covered and over 5,000 natives examined. These belonged to three groups the Roro a coastal tribe the Mekeo a subcoastal, and mountain groups living at 5,000-7,000 feet. The results are set out in tables giving in detail and in summary the vital statistics and disease incidence in each of the three groups. It is seen at once that yaws and two forms of tinea preponderate in the Mekeo and Roro tribes. Yaws the author believes was introduced from Polynesia in the first half of last century. It has made little progress inland possibly owing to altitude but more probably to the absence of intimate contact with the disease, for when coastal natives were entertained for the first time at a mountain dance several of the mountaineers contracted a severe form of yaws. A table gives the age distribution of 397 cases and demonstrates the usual proponderance of secondary cases in children. The tertiary manifestations included periostitis of the tibia, extensive cutaneous ulceration and scarring periaricular nodules and plantar yaws.

True tropical ulcer was seen in less than 1 per cent. and mostly in young children none in the mountain districts. *Tinea imbricata* was widely spread in the coastal tribes in both young and old but some natives seem to have an absolute immunity. *Tinea floa* was not seen in children under 12 years of age.

In the Mekeo the maximum amount of malaria occurs in children from 2-5 years all children have enlarged spleens it is a hyper endemic malarious area (CHRISTOPHERS). The parasite is *P. falciparum* and the vector *A. punctulatus* var *molluscensis*. The salting process it is stated kills few babies and the Mekeo population is increasing. Two cases of filariasis were seen in one village where a night survey showed embryos in the blood of all natives over 45. A hookworm survey of one of the Mekeo villages failed to find ova in the stools of the children. The village pigs promptly remove human excreta and it is suggested that this and a good diet keep hookworm disease sub-clinical. Details are given of seven cases of leprosy believed to be a disease of recent introduction. All were chronic and there were no skin lesions it is doubtful whether they were infectious. Of general diseases those seen and discussed are goitre infantile paralysis dermatitis ab igne paralysis agitans rheumatic carditis and myasthenia gravis.

Goitre was found in four mountain villages and its aetiology is discussed. The native belief that it occurs in women who eat pig during gestation recalls the statement of McCARRISON that excessive diets of protein and fat can produce goitre feasts of pig in this region may last a month.

GARALDON (Arnoldo) Carbarsone Its Action on *Trichomonas hominis* and on Rat Trichomonads In Vitro.—Amer Jl Hyg 1935 Sept. Vol. 22 No. 2 pp. 326-338. With 2 charts.

Carbarsone diluted in culture fluid at a concentration of 0.3 per cent. was lethal to both *Trichomonas hominis* and a rat trichomonad in less than 72 hours. In weak solutions (0.05 per cent.) the drug retarded the development of the flagellates in culture. C. M. F.

MAMMO (Achille) Contributo allo studio della metacidiosfera.—An. d. Med. Nav. e Colon. 1935 Sept.-Oct. 41st Year Vol. 2 No. 3-4 pp. 611-651. With 4 figs. [100 refs.]

often tabu as possible means of access for the evil eye mosquitoes or other unwelcome visitor

Plague dysentery smallpox and cerebrospinal fever are prevalent from time to time. Laws helminthiasis and deficiency diseases constantly affect a proportion of the population. Every adult native has developed a tolerance to the malaria parasite. Trachoma venereal disease and tropical ulcer are very prevalent.

There are four African sanitary orderlies in charge of the health work of rural areas. Each is posted to the headquarters of a county where he lives in a model compound. The average monthly cycle running of these men is 800 miles.

The above excerpts from an interesting paper are sufficient to illustrate the magnitude of the problems facing a small enthusiastic band of health workers.

Norman White

MAURITIUS. Annual Report of the Bacteriological Laboratory for the Year 1935 [ADAMS (A. R. D.) Senior Pathologist & Superintendent] —22 pp 1935 Dec. 2.

The Annual Report of the Government Pathologist Mauritius again contains much of interest. The use of McCartney's procedure and of canned media had considerably facilitated the routine work. The actual number of specimens dealt with in routine was a little less than in the preceding year. These are divided into pathological including microscopical examinations of blood, faeces, urines, sputa, throat and nose swabs and tissues, and serological work bacteriological examination of the same materials and of water supplies medico-legal research and miscellaneous. The results of the water analyses are satisfactory in the colder months less so in the warmer on account of algal growth. Dr Adams is of opinion that some physico-chemical precipitation treatment prior to filtration would be better than chlorination.

Trypanosoma bovis appears to be common in the *Triatoma rubrofasciata* the reduviid bug of Mauritius. Dr MADGE is collecting material from cases of human myiasis further instances of infestation by *Berthella studeri* have been observed 5 having now been recorded in Mauritius.

Two special problems of research have been pursued the first was the investigation of the molluscan host of the *Schistosoma haematobium* endemic in the island viz. *Bulinus (Pyrgophysa) forskali*. This is widely distributed in running water throughout the Colony and has been found on watercress and other edible plants in the market stalls and is consequently of much public health importance. Its small size results in its producing only a few cercariae each but this is compensated by their large aggregations. Previous lack of success in experimental work is ascribed to under infestation. A survey of the waterways of the island is to be undertaken to determine the distribution of these snails and also a survey of the prevalence of the disease they convey. A second important research problem taken in hand was trypanosomiasis of stock three species *T. evansi*, *T. vivax* and *T. theileri* being found in indigenous cattle. This is dealt with elsewhere in this Bulletin [see p. 650].

Four papers have been published by Dr Adams during the year, namely —

- 1 Studies on Bilharzia in Mauritius. II The Recovery of *Adult Schistosoma haematobium* after Development in *Baboons* (*Papio physa*) forshall *Ann. Trop. Med. & Parasit.* 1935, Vol. 29 p. 233.
- 2 Trypanosomiasis of Stock in Mauritius. I *Trypanosomes* *etc.,* Parasite of Local Stock. *Ibid.* p. 1
- 3 Ascariasis of the Liver *Trans. Roy. Soc. Trop. Med. & Hyg.* 1935, Vol. 28 p. 419
- 4 A Fourth Case of Human Infestation with *Bertholdia sheldoni* (Cestode) in Mauritius. *Ibid.* Vol. 29 p. 361 H. H. S.

WISCHER (Matthews) *Medizinische Erfahrungen unter den Dayaks in Süd-Borneo.* [Medical Practice among the Dayaks of South Borneo.]—Schweiz. *Med. Woch.* 1936, Mar. 28, Vol. 46 No. 13, pp. 315-320 With 12 figs. [12 refs.]

This is an account by a Swiss missionary of the conditions of vital statistics and diseases seen in six years at a mission hospital in S. Borneo. It differs little from similar accounts of primitive natives in other parts of the tropics but comes from a little known region.

These Dayaks inhabit a lowland district five motor-boat hours from the capital, Banjarmasin situated on the south coast of the island. The author saw 17,258 patients representing he thinks 3,000 Dayaks. The population is scattered.

Of tropical disease *malaria* is general, chiefly tertian but also subtertian. Severe forms are rare and blackwater has not been seen. In 1933 malaria formed 26 per cent. of diagnoses. Quinine, phasmopine and atebelin are all used in treatment. Atebelin as a patent medicine is obtainable by anyone. The author says it has overcome the mistrust of the natives and now threatens the flourishing quinine industry of the Netherlands Indies. Refractory cases however are still met with. *Amebiasis* is said to cause 10 per cent. of admissions. It is treated by emetine and to a greater extent by yaoren which is readily obtained by the natives. Spirocid is also useful but the author has seen toxic symptoms follow a moderate dose. Liver abscess is not uncommon emetine injections are curative and operation is never needed other forms of dysentery are not mentioned. Yaws is widely spread. Practically every Dayak suffers or has suffered. Neosalvarsan is the best drug, 0.3 gm. for a grown man larger doses may be followed by unpleasant symptoms. Bismuth injections are less effective. Spirocid is useful. The author finds that spirocid and salvarsan are less dangerous in yaws than in syphilis. Syphilis is rare in this region and he sees no objection to spirocid treatment of yaws by school teachers. Owing to the high price and the indolence of the natives there is little risk of overdose. Salvarsan-resistant cases are treated by Terpa Stahl A, a Swiss preparation recommended by Albert Schweitzer. It is estimated that one per mille of the population suffers from leprosy. Lepers are segregated by the natives when the disease is far advanced. It is children who contract leprosy adults very rarely. Of leper colonies he aptly writes—As philanthropic establishments they are indispensable, as research institutions they are important, for the combatting of endemic leprosy they are useless (untauglich). Of other diseases tuberculosis, chiefly pulmonary is wide-spread. *Koch's tubercle* forms 0.5 to 1 per cent. of diagnoses and is found in children between 4 and 15 years, as a rule convalescents from dysentery and

gastro-enteritis. Cod liver oil is rapidly curative. Typical signs of rickets were seen in 1 to 1.5 per cent. of treated children sick children are confined by the natives to their dark houses and fed on rice. *Tinea imbricata* is widely spread and refractory to treatment. Syphilis is very rare and gonorrhoea very mild. A table follows of the frequency with which a number of diseases were seen. The illustrations depict chiefly yaws.

A G Bagshawe

BRUNELLI (Piero) Cenni nosografici sulla regione di Gedda. [Disease in Jeddah and its Environs.]—*Arch Ital Sci Med Colon e Parasit* 1936 Jan. Vol. 17 No 1 pp 34-48. With 8 figs

Included in the sanitary and medical organization of Jeddah is an English doctor a Dutch surgeon in charge of a Javanese medical man, a Russian Legation Dispensary and an Italian dispensary while the local Government entrusts the sanitary measures to the hands of Syrian doctors and pharmacists and the laboratory is directed by a Turkish doctor. Unfortunately this article gives no figures resting content with general vague terms. At the time of the Mecca pilgrimage tens of thousands of persons of all ages and either sex are gathered there young children old people many suffering from serious disease, women in advanced pregnancy. Reference is made to the climate water supply (or lack of it) and prevalence of mosquitoes. The spleen index in the town is very high it is given as 88 per cent of the children of 70 blood specimens positive for malaria 44 showed *P vivax* 16 *P falciparum* 9 both these and one *P malariae* (there was a little uncertainty about this). *Phlebotomus papatasii* abounds also in the heat of summer *Aedes aegypti* and many cases of dengue occur. *Dracunculus* is seen among the Beduins and a few cases of filariasis but only in those from the interior. Syphilis is not very common more frequent are cases of soft chancre and gonorrhoea and more rarely granuloma venereum [no mention is made of Lymphogranuloma inguinale]. Amoebic dysentery is common and, in children diarrhoea associated with Giardia. Of helminthic infestations ascariasis heads the list ankylostomiasis coming next one case of *T saginata* is noted. Trachoma affects hundreds of victims every year. Asthma is widespread [nothing is said of the prevalence of tuberculosis]

H H S

WATSON (Alexander J.) Vincent's Disease.—*Chinese Med Jl* 1936 Jan. Vol. 50 No 1 pp 48-49 With 2 charts.

During the four months November 1935-February 1936 the author saw 20 cases of Vincent's angina occurring in a local outbreak at Yunnanfu, and other milder cases probably escaped observation. The symptoms were except for difference of degree very similar in all—thick exudate on the tongue (half the thickness of the tongue), difficulty in moving the tongue, some salivation and dysphagia and a deep sore throat about the level of the hyoid. *B fusiformis* and spirilla were present, sometimes one predominating sometimes the other and there was usually a stomatitis with ulceration of palate, tongue or lips. The false membrane which some writers have reported in cases of Vincent's disease was not seen in those of the author. The temperature was not very high up to 102°F or a little higher (102.4°F).

In some 2-3 weeks elapsed before free movement of the tongue was regained, the inflammation at the base being severe. *C. difformis* though looked for was not found.

H H S.

SNIJDERS (E. P.) Over het onderzoek van het scleroma respiratorium (rhinoscleroma) in Ned Indië. [Investigations into Rhinoscleroma in Netherlands India.]—Reprinted from *Festschrift 1936 v. de Geneesk. Tijdschr. v. Nederv. Indië* pp. 397-410.

This is a review of our knowledge of rhinoscleroma and a recapitulation of the steps by which it was established as a definite disease in the Netherlands Indies. A description of the condition is given as: An inflammatory process into which there enter degenerative, exudative and proliferative phenomena. The infiltration is mainly of plasma cells, often degenerated and hyaline, with a variable accompaniment of lymphocytes and polymorphonuclears. It is a chronic condition with very special localization and morphological character. Foamy macrophage cells, sometimes filled with capsule bacteria, may also be a microscopic feature.

Other characters of the disease are that it has been found especially in the Batak lands of Sumatra, that it is endemic, chronically but comparatively slightly infective, and of familial incidence. It is in some respects reminiscent of leprosy and is essentially a disease of the great unwashed. Evidence of a circumstantial character has been produced that it is a disease of ancient times, still clinging to the Mohammedan element of the ancient Batak people but obviously a disease which is dying out with the advent of hygiene. In nearer British India the disease has been signalled in Chota Nagpur and an endeavour is made to link up the people of this plateau of the Munda and Kolar stem, with the people of the Batak lands. Research in the Chota Nagpur region might offer some further proof of this connection.

A typical scleroma is not known in animals nor has the condition been transmitted experimentally to animals, but the author considers that there is a possibility of the pig being a carrier. Pure cultures of what is presumably the causal organism, *Alebella rhinosclerosans*, are obtainable from the deeper tissues of the lesions produced and there is every reason, from cultural and serological tests, with antigen analysis, to regard this organism as specific. It is to be distinguished from *K. ozaenae* and *K. pneumoniae*. Although these organisms may be associated with it in nasal mucus, they are not to be found in the deeper parts of affected tissue which, nevertheless yield pure cultures of *K. rhinosclerosans*.

W F Harry

KARUKARADNE (W. A. E.) The Pathology of Rhinosporidiosis.—*J. Path. & Bact.* 1938 Jan. Vol. 42 No. 1 pp. 193-211
With 26 figs. (4 coloured) on 7 plates. [37 refs.]

Summary of the fifty-three reported cases.

"Geographical distribution. This is remarkable for its occurrence over a wide area and the cases have also been very isolated. Most of the patients have been Indians (40) with a few in Ceylon (4), North America (5), South America (3) and Italy (1). The very wide distribution of the disease is noteworthy. In the solitary European case (Orlandi) a woman, aged 56 developed a rhinosporidial growth in the conjunctiva following injury of the eye by a splinter. Seeber's original

case was also a native of Italy but he had been resident in South America since his infancy. The case described by Ashworth was that of an Indian student who had come to Edinburgh for purposes of study and the two other cases referred to in his monograph were also Indians. Of the four cases reported from Ceylon three had not been out of the island. With my 34 cases the total number from Ceylon is only a little short of the total of Indian cases. All 6 cases reported from North America occurred in widely separated areas. Only one had been outside the United States and that was for a three days visit to Canada. The case described by Wright (1907) had lived all his life in the neighbourhood of Memphis (Tennessee) whilst Graham's case, a 12 year old negro boy born in Georgia had resided in a small coal mining village in Alabama since he was four.

Age The ages recorded in 33 cases only ranged from 8 to 60 years. The disease mainly affects young subjects 24 of the 33 being below the age of 30 and 12 below the age of 20.

Sex Only 4 of the 53 cases were females.

Anatomical Distribution In 40 of the 53 cases the lesion was in the nose, mainly the anterior part. The conjunctiva was affected in 8 the lacrimal sac in 2 cases and the disease occurred once each in the penis uvula and external auditory meatus. One patient a woman, had both a nasal growth and an independent growth on the posterior pillar of the fauces. In my own series of 34 cases two were conjunctival one lacrimal and the rest nasal.

POLIDORI (Tommaso) I micetomi in Somalia. [Mycetoma in Italian Somaliland]—*Arch Ital Sci Med Colon e Parassit* 1936 Jan. Vol 17 No 1 pp 19-33 With 7 figs

The author has collected and reports in tabular form cases of Madura foot and other mycotic affections seen by him at the Civil Hospital at Mogadiscio (Mogdishi on the Benadir coast). Five of the former and 57 of other forms are mentioned. Many in fact the majority are not seen until the later stages the patients regarding the condition as syphilitic or as resulting from some insect bite until the tumour is of a size to impede walking or the ulceration, abundance of secretion and foul odour force them to seek assistance. Large doses of potassium iodide rarely give satisfactory results and in many cases amputation is necessary though, if the patient is seen early enough enucleation may succeed. The author has never observed metastases but if enucleation is not thorough recurrence takes place. All the patients were in a state of failing health, with anaemia and many of them showed signs of food and vitamin deficiency.

H H S

PARIKE (Nicola) Osservazioni cliniche e ricerche sperimentali sulla nocardiasi.—*Giorn Ital di Malat Exot e Trop* 1935 Aug 31 Sept. 30 & Oct. 30 Vol. 8 Nos. 8 9 & 10 pp 195-8 201-4 207-8 234-6 239 248 251-5 257-8. With 15 figs

CHOPRA (R. N.) & CHAUDHURI (R. N.) The So-called Mystery Disease of Calcutta (*Jhun Jhuria or Thakharia*)—*Indian Med Ga.* 1936. Apr Vol. 71 No 4 pp 205-209

This so-called mystery disease seems to have started suddenly last September in villages at Bolbula and Katakhali on the Ichamati river and after visiting a village for about a week passed on to the next. As many as 40-50 persons might be attacked in a night. Most were

between 18 and 35 years. Mohammedan females almost entirely at first latterly both males and females and Hindus also, and most attacks started in the late afternoon. The following is the recorded train of symptoms —

"The disease is said usually to start suddenly with a tingling sensation in one or both feet, especially the big toes. The sensation then spreads up along the body to the head. Many patients are said to complain also of headache, giddiness and a hot burning sensation in the head. Simultaneously with or soon after this subjective sensation, the victim begins to shiver and may have severe movements of the whole body. The eyes are said to be intensely congested and the body stiff during an attack. Symptoms vary in severity; they may be mild or severe consciousness is as a rule retained. The attack lasts from a few minutes to a few hours.

The name *jhunjhnia* implies tingling sensations, and therefore shivering. Brief details, but all the essentials are given of 17 cases. The local lay treatment consisted in tying the patient to a tree to keep him erect as lying down might lead to a fatal rush of blood to the brain, then cold water bucketful after bucketful to the number of 100 or more is poured over the head to drive the blood back to the legs until the patient asks for a cessation of treatment. The only conditions revealed by physical examination have been an increase in the knee-jerks and in the pressure of the cerebrospinal fluid in some cases. The latter may be accounted for by the effect of the chilling resulting from the water treatment.

The condition is probably a neurosis of the auto- or hetero-sugested category [comparable with latah, tarantism] for considerable notoriety had been given to it in the press, all the patients had discussed it with their neighbours prior to being attacked and a sort of panic concerning it had been set up.

H H S.

SOEGIRI. Een geval van mimi vergiftiging. [A Case of King Crab Poisoning.]—*Gesent. Tropische en Neotrop. Indië* 1938, pt. 7 Vol. 78, No. 14, pp. 880-883. With 4 figs. on 2 plates. [Summary appears also in *Bulletin of Hygiene*.]

A description is given of presumed mimi or king crab poisoning with fatal result. The patient a fisherman of powerful build, partook of a meal of this crab in spite of the warnings of his companions. That this was dangerous seems to have been known, but it was also reported that the danger could be eliminated by a certain mode of cooking. So symptoms followed immediately on the meal, but the man on return with his fellows to their fishing vessel had fallen down suddenly and lost consciousness. The jaws were rigidly fixed open and there was foam upon the lips. No twitching and no vomiting occurred. Death took place about 6 hours after the meal. An autopsy was carried out, which showed no obvious cause of death and in the stomach contents were the remains of a meal of king crab. There is no reason to suppose that death was due to any other cause than that assigned.

W F HARRIS.

FLECKER (H.). Cone Shell Mollusc Poisoning, with Report of a Fatal Case.—*Med J Australia*, 1938, Apr 4, 23rd Year, Vol. 1 No. 14, pp. 464-466. With 2 figs.

Fatal results from *Coneus* poisoning are rare. The author gives summaries of the symptoms in 5 non-fatal cases referred to by Professor

CLELAND in the *Australasian Medical Gazette* 1912 Three years later a fatal case was recorded. The present instance was reported in response to a questionnaire sent to all practitioners in North Queensland asking for information on injuries caused by plants or animals in tropical Queensland.

A man of 27 years picked up a live cone shell (*Conus geographus*) on Haymen Island. He was stung in the palm a small puncture mark being seen. Local numbness started without any pain ten minutes later he felt a stiffness of the lips ten minutes later still the sight was blurred and there was diplopia paralysis of the legs set in half an hour later after the stinging and in one hour he lost consciousness and died five hours from the time of the injury Post mortem revealed nothing abnormal the organs all appeared to be healthy. The species in the five cases recorded earlier were *C. aulicus* *C. tulipa* both producing mild symptoms *C. textile* mild *C. geographus* (2) one certainly severe and the previous fatal case was due to *C. textile*. In all of these the pain was severe and in one case the patient writhed in agony. Medical men generally are unaware of the poisonous effects of these animals and the danger of picking up living cone shells but the natives are fully acquainted with it and treat it with dread and respect

H H S

BODEAU A propos de quelques accidents dus au mancenilier [Accidents due to *Hippomane mancinella*]—*Arch Méd et Pharm Nav* 1933 Jan-Feb-Mar Vol. 123 No 1 pp 122-133

Hippomane mancinella the Manchineel Tree, is one of the Euphorbiaceae. It is common in the Antilles and on the shores of the Gulf of Mexico. The fruit resembles a small reddish apple it has an acrid and rather disagreeable taste but some persons sailors in particular have been known to eat several. Its effect is to produce severe burning pain in the mouth and stomach followed by nausea and vomiting and later difficulty in swallowing. The lips and buccal mucosa become swollen and blistered and eroded aphthous patches appear. There are signs and symptoms of collapse and death has been recorded.

Apart from the fruit a latex oozes from bruised leaves or broken branches and has an irritant and vesicant action. The effect is often seen on the skin of those who take shelter under these trees from a storm. Small vesicles from the size of a pin's head to a nut by confluence are caused. Treatment is purely symptomatic.

The latex has been used as a rubefacient and counter irritant and also as an anthelmintic [but no details as to results are known to the reviewer]

H H S

RAYMOND (W D) The Poisonous Effects of Some Local Species of *Euphorbia*—*East African Med Jl* 1936 Mar Vol. 12 No 12 pp 368-374

Nine species of Euphorbiaceae are mentioned by the author. The poisonous properties are not equally potent in all. The latex acts as a local irritant when applied externally and, as would be expected acts similarly but more severely on the mucous membranes. Thus if introduced into the eye it sets up conjunctivitis and even keratitis ending in blindness in the nose sneezing inflammation and epistaxis in the alimentary tract, vomiting diarrhoea colic, followed by collapse

convulsions and death. Its action in man differs from that in animals in degree and perhaps in kind. Many plant-eating animals can eat it without harm, and the toxic dose, of *E. tenescens* for example, is for dogs about 30 times as great as that for man. At autopsy if death has occurred from ingestion of the poison, there are signs of acute gastro-enteritis, ulceration and perhaps perforation.

The juice of some varieties is used as an emetic in cases of snakebite, others as an anthelmintic and for gonorrhoea, the roots and leaves of others as purgatives. [Several members of the Euphorbiaceae are employed for manufacturing arrow poisons and these act both locally as an irritant and also as cardiac poisons. The Manchineel Tree (*Hippomane mancinella*) a native of the West Indies and Tropical America belongs to the same order. It has a fruit resembling an apple and causes severe burning pain and tenderness in the mouth and stomach, nausea and vomiting followed by swelling and blistering of the lips and tongue and later by aphthous erosiona. See preceding abstract.]

H H S.

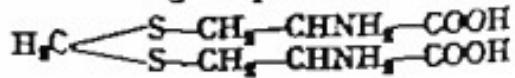
TOKKING (H. D.) Pyrethrum Dermatitis in Kenya. With Note by J. H. SEQUEIRA.—*East African Med. Jl.* 1938, Apr. Vol. 15, No. 1 pp. 7-14 [11 refs.]

Pyrethrum, *Chrysanthemum cinerarium/folium*, of value as an insecticide grows well in Kenya, particularly at a height of 5,000-7,000 feet, and flowers throughout the year. In fact its cultivation is a growing industry. Probably some 200 Europeans in the Colony are now cultivating it for commercial purposes. The pyrethrum content is 1 per cent. as in other countries, e.g. Dalmatia and Japan but these last have but a short season of growth. Sweating facilitates solution of the irritant constituents and so enhances their action. The effects produced are Itching at the corners of the eyes, lacrimation, irritation of the nasal mucosa with rhinorrhoea, itching on exposed parts of the body a papular and vesicular rash, flaking or peeling of the skin and painful fissures. Exposure to sunlight exacerbates the lesions. Some persons show merely a local dermatitis from contact, others systemic allergy. Both Europeans and natives are affected, but as a rule the former more severely. Brief details of six cases are given. Removal from contact and the application of some simple protective ointment suffice for the local treatment, allergic patients must forgo contact with the plant which probably entails leaving the district, or desensitization methods may be tried.

H H S.

HIJMAN (A. J.) & VAN VEEN (A. G.) Over het djengkolzuur, een nieuw zwavelhoudend aminozuur [Djenkol Acid, a New Sulphur-containing Aminoacid.]—*Genesit. Tijdschr. v. Neder.-Indië* 1938, Apr. 7 Vol. 78, No. 14 pp. 840-859 With 4 charts. English summary [14 refs.]

Djenkol acid is believed to be responsible for the toxic symptoms occurring after ingestion of the djenkol bean, *Pithecellobium dulce*. These symptoms are chiefly urinary—pain in the kidney area, dysuria, often anuria—the urine contains blood and casts and sharp acicular crystals with the following composition



Their presence in large numbers in the urethra may cause necrosis fistula and extravasation. The djikenol bean has a high vitamin B₁ content and in spite of its toxic properties is used considerably as a food. Experiments on rabbits showed that it was oxidized in the body to about the same degree as cystin, but after a few weeks the percentage of amino-acids excreted (in the form of sulphates) decreased, possibly in part from metabolic disturbance partly from injury to the kidneys. Tests were made with rats to determine whether djjenkol acid could replace cystin in the food but the results were not conclusive. The eating of the beans by normal persons was followed by distinct increase in sulphur excreted, but the extent of this varies greatly. One man after eating two beans only suffered from anuria for two days although he had taken only about 150 mgm. more sulphur he excreted 1,980 mgm. of oxidized sulphur and 2,980 mgm. total sulphur. Clearly other sources of sulphur must have been mobilized H H S

GREVENSTUK (A.) Over Rengha- en Japanlak vergiftiging —Geneesk Tijdschr v Nederl Indië 1935 Nov 26 Vol 75 No 24 pp 2065-2076 [19 refs]

convulsions and death. Its action in man differs from that in animals in degree and perhaps in kind. Many plant-eating animals can eat it without harm, and the toxic dose of *E. resinosa* for example, is for dogs about 30 times as great as that for man. At autopsy if death has occurred from ingestion of the poison there are signs of acute gastritis, ulceration and perhaps perforation.

The juice of some varieties is used as an emetic in cases of snakebite, others as an anthelmintic and for gonorrhoea—the roots and leaves of others as purgatives. [Several members of the Euphorbiaceae are employed for manufacturing arrow poisons and these act both locally as an irritant and also as cardiac poisons. The Manchineel Tree (*Hippomane mancinella*) a native of the West Indies and Tropical America belongs to the same order. It has a fruit resembling an apple and causes severe burning pain and tenderness in the mouth and stomach, nausea and vomiting followed by swelling and blistering of the lips and tongue and later by aphthous erosions. See preceding abstract.]

H H S

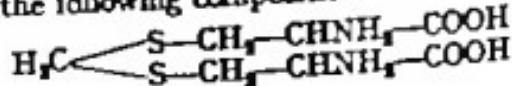
TOKING (H. D.) Pyrethrum Dermatitis in Kenya. With Illus.
J. H. SEQULIRA—*East African Med. Jl.* 1936, Apr Vol. II
No. 1 pp. 7-14 [11 refs.]

Pyrethrum, *Chrysanthemum cinerariifolium*, of value as an insecticide grows well in Kenya, particularly at a height of 5,000-7,000 feet, and flowers throughout the year—in fact its cultivation is a growing industry. Probably some 200 Europeans in the Colony are now cultivating it for commercial purposes. The pyrethrum content is 1-2 per cent. as in other countries e.g. Dalmatia and Japan but these last have but a short season of growth. Sweating facilitates solution of the irritant constituents and so enhances their action. The effects produced are Itching at the corners of the eyes, lachrymation, irritation of the nasal mucosa with rhinorrhoea, Itching on exposed parts of the body, papular and vesicular rash, flaking or peeling of the skin and perianal fissures. Exposure to sunlight exacerbates the lesions. Some persons show merely a local dermatitis from contact, others systemic allergy. Both Europeans and natives are affected, but as a rule the former more severely. Brief details of six cases are given. Removal from contact and the application of some simple protective ointment suffice for the local treatment; allergic patients must forgo contact with the plant which probably entails leaving the district, or desensitising methods may be tried.

H H S

HIJMAN (A. J.) & VAN VEEN (A. G.) Over het djengkolzuur en nieuw zwavelhoudend ammonium [Djenkol Acid, a New Sulphur-containing Ammonium]—*Gesamt. Tropenkr.* Nedol. Inst. 1938, Apr 7 Vol. 76 No. 14 pp. 840-859 With 4 charts. English summary [14 refs.]

Djenkol acid is believed to be responsible for the toxic symptoms occurring after ingestion of the djenkol bean, *Pithecellobium dulce*. These symptoms are chiefly urinary—pain in the kidney area, dysuria, often anuria—the urine contains blood and casts and sharp acicular crystals with the following composition:



from rodents but reject the idea in order to reassert their well known and well-reasoned opinion that pneumonic plague in its principal foci like Egypt Madagascar South East Russia Transbaikalia and Manchuria usually originated in human cases with secondary lung involvement. On the further question of why pneumonic epidemics arise it is excusable to find a greater dubiety,asmuch as controversy is still as acute as ever on the reason for development of the epidemic or pandemic characters of any disease.

The illustrations throughout the work are clearly reproduced and the cost of it is very moderate. It should undoubtedly become a source of reference to many others than those for whose use it has been primarily designed.

W F Harvey

HUARD (P) & MEYER MAY (J) *Les abcès du foie* Préface du Professeur A. GOSSET [Liver Abscesses.]—pp viii+390 With 98 figs. 1896 Paris Masson et Cie. 120 Boulevard Saint Germain. [65 francs.]

This is a very detailed account of liver abscess based on 150 cases seen or collected by the authors in Tonking where they are of the opinion the disease is rarely caused by amoebae. The account therefore promised to be of great interest and importance in differentiating the large proportion of their cases that they regarded as being of unknown aetiology for the pus of 60 out of 93 cases examined at the time (they were treated by the open operation) was free from both amoebae and bacteria in 7 it contained amoebae and in 27 several varieties of cocci and four species of bacteria were found not more than 4 being due to any one organism.

After summarizing in tables their own data and those of other workers including experience in India they describe the anatomy and blood vessels of the organ and the aetiology just mentioned. A detailed account of the pathological anatomy and complications illustrated with diagrams of the spread of the infection to neighbouring organs and cavities unexpectedly reveals precisely the picture of amoebic liver abscess of other warm countries and the clinical picture also shows nothing indicative of a new and previously undescribed form of abscess in the liver. The differential diagnosis is well described with illustrative cases somewhat condensed from the fuller accounts of all of them at the end of the volume. A noteworthy feature of this section is exploratory puncture, on the lines of spleen puncture to allow of microscopical examinations of the material thus obtained by this means cancer tuberculosis and other conditions were recognized in some suspected liver abscess cases. Still more interesting is the section on X-ray examinations for this includes the previous injection of lipiodol to allow the shape of an abscess cavity and its communication with secondary abscesses or a bronchus to be defined.

Turning to the section on treatment we find more of interest. First they glance at that in use in other countries and come to the remarkable conclusion that the difference in the methods used in some can only be explained by a difference in the class of abscesses met with. In discussing medical treatment they agree with others that arsenical, yatren and bismuth preparations etc. are all useless in congestive hepatitis and only emetine is effective but they differ in holding that the latter drug is equally curative of both amoebic and non-amoebic hepatitis. The now generally used aspiration and emetine treatment of liver

abscesses is rejected by the authors, although they hold that the previous use of emetine reduces considerably the incidence of abscesses, and they advocate courses of ten days at a time in the treatment of both acute and chronic hepatitis. A full description of the open operations which they always adopt is then given, including deep incisions with extensions of some aided by radiology to enable the abscess to be reached by the most direct route. Their case mortality was 24 per cent. against 3.3 per cent. in K. K. Chatterji's 186 cases and nil in Ludlow's 47 cases (later 1 in 50 or 2 per cent.) by the aspiration method, which they quote. They also admit that in 74.3 per cent. of their 35 fatal cases the pus was sterile, and attribute the high mortality to " cachexia " and complications but these are equally present in Calcutta cases. They deal with the rare secondary haemorrhages, and only mention secondary sepsis, which does not appear to have been by any means excluded as an important cause of death as it used to be after the open operation in India.

We may now return to the main thesis of the authors, namely, that two-thirds (they say three-fourths in one place) of their liver abscess cases are of unknown aetiology and sterile in spite of their differing in no way from cases seen in other warm climates. Their assertion that only seven per cent. of their total cases were of amoebic origin appears to be based solely on the fact that that organism was only found in the pus of 7 out of 83 cases examined at the time of opening the abscess but as emetine was given in a number of the non-amoebic cases in which the medical treatment is mentioned in their notes, and is advocated by them in all cases of hepatitis, such negative results do not exclude an amoebic origin. Indeed they quote Constantini as saying that thanks to emetine, a liver abscess will no longer contain living amoebae. This appears to be a far more likely explanation of their results than that two-thirds of Tonking cases are due to some other distinct unknown cause, yet produce precisely the same pathological changes and clinical course as amoebic cases seen elsewhere. If this is so then advocacy of the open operation, with eight to twelve days the mortality following aspiration in Korea (Ludlow) and in Calcutta falls to the ground, in spite of the advanced surgical technique displayed in their work. The monograph is worthy of careful study.

Lionard Rynd

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PELLAGRA AND PELLAGRA LIKE CONDITIONS IN WARM CLIMATES

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Sectional Editor Tropical Diseases Bulletin

SECTION I *

It is just over two hundred years ago that the malady which later became known as Pellagra was first the object of study. During two centuries endemic pellagra has waxed and waned and then again flared up of very considerable economic importance, the object of many observations the subject of numerous investigations the theme of divers theorizations the disease remains to-day very much what it was in 1931 when R. H. TURNER remarked that "Pellagra (was) unique in the scarcity of accurate information etiology uncertain pathology obscure diagnosis a matter of opinion, criteria of cure unknown, cause of death not understood."

The attention of Gaspar CASAL a physician of Oviedo was first drawn to the sickness about 1730 then known to the peasantry of the province of Asturia in North West Spain as *Mal de la Rosa*.

About 1755 the disease was recognized under the name *Scorbuto Alpino* by Antonio PUJATI of Venice among the inhabitants of the village of Feltre in the province of Belluno but no account of the disease was published in Italy until Francesco FRAPOLLI of Milan set forth, in 1771 his observations made in Lombardy—*Animadversiones in morbum VULGO PELAGRARI*—thus introducing the name by which this scourge was known to the local peasants.

What had happened in Spain and Italy then happened in France. In 1829 Gustave HAMEAU a country practitioner living in the Teste de Buch district communicated to the Royal Society of Medicine, Bordeaux, observations he had been collecting during the previous ten years upon an affection among the miserable inhabitants living just to the south of the Bay of Arcachon which later proved to be none other than pellagra.

In the latter half of the century it was recognized successively in most of the southern states of Europe then Asia Minor and Trans-

Section II will appear in the November 1938, issue, and Section III with a list of references relating to Sections I-III in the December 1938, issue (1445)

caucasia. During the present century attention has largely been focused upon pellagra in the more southern areas of the United States. As far back as 1834 GRAY of New York published an account of a single case. Then in 1902 H. F. HARRIS put on record a case associated with ankylostomiasis. In 1907 six authors wrote upon pellagra in U.S.A., two years later in 1909 one hundred and fifty papers appeared on the subject and since then a vast literature has accumulated upon the disease.

To give some idea of the proportions this endemic may reach a few figures may be given. In the Province of Lombardy with a population of nearly one and a half millions settled in 1,253 communes there were in 1830 over 20,000 cases of pellagra, in some areas 3.5 per cent. of the population being affected. In 1891 among sixteen and a half million total population of affected provinces there were over 100,000 pilgrims.

It was estimated by C. H. LAVENDER that between 1907 and 1912 there were 30,000 cases of pellagra in U.S.A. with a 30 per cent. mortality. In 1916 it was stated that there were in the southern states 150,000 cases with between ten and fifteen thousand deaths.

F. L. HOFFMAX (1933) gives the number of deaths from pellagra in the 5-year period ending 1932 as 30,000.

In Romania in 1918, the number of cases of pellagra was estimated at 70,000.

In Transcaucasia with a total population of 1,300,000 E. G. VASS (1933) estimated the number of cases of pellagra at between thirty and fifty thousand, the proportion of females to males being as 3 : 1.

It is interesting to note that though all these great epidemics have been associated with maize as the chief article of diet, no endemic pellagra has been signalled from tropical countries, leaving out for the moment Egypt even in those in which maize is the staple article of food.

When sporadic cases of pellagra were first discovered in France their authorities refused to acknowledge them as true pellagra and the same failure to realize sporadic pellagra persists to-day. In any case it must be a disease difficult of recognition unless the possibility be borne in mind. Unquestionably many cases all the world over pass unrecognized and die undiagnosed. With interest once awakened, pellagra will often be found if searched for where previously unsuspected as well exemplified by T. E. H. THAYER (1933) and others in Brazil.

With this brief reference to pellagra in temperate countries it is interesting on turning to warm countries and the tropics to find how rarely the disease has been observed, if we can judge by published reports.

In the following pages, although it cannot be considered to be exhaustive, some attempt has been made to collect together our knowledge of the geographical distribution of the disease.

AFRICA.—To F. PRUMER (1847) is usually ascribed the first description of cases of pellagra in Egypt though Billod at the time was inclined to accept them as such.

Under the heading of "Leprosies" PRUMER said "Pellagra is sporadic in Egypt and such as we have studied it in Milan. We have seen three cases among the peasants one of whom presents to-day twelve years after our first seeing him parents of the upper limbs, with retraction and muscular atrophy."

A. FIGARI (1865) wrote of a venereal disease in Lower Egypt exhibiting a kind of Leprous Pellagra. HAMEAU's son recognized pellagra in a soldier returned from Algeria in the Hospital of St. André Bordeaux, in 1850. DE BUCHERIE saw cases among the inhabitants of the Bu-Mezug Valley and among the inmates of the prisons at Ain and Bey. He thought that the first cases of pellagra to be recognized in Tunisia were those noted by ABEILLE in 1851 among Arabs near Calle between Bône and Tunis. An account of pellagra in Algeria was published by J. de PIETRA SANTA (1880). In 1891 Surg Capt AYLES (cited by Sandwith) saw four cases of pellagra among 6,000 starving Arabs at Tokar on the Red Sea Coast.

Pellagra in Egypt is usually associated with the name of F. M. SANDWITH writing in the British Journal of Dermatology (1898) he gave an account of his discovery of the disease in Egypt in 1893 and of subsequently seeing 500 cases among the maize-eating fellahs. It is unnecessary to make further reference here to the disease in Egypt the facts are well known.

It is stated that SANDWITH saw one or two cases of pellagra among the inmates of the leper colony on Robben Island this statement is repeated by DRUMMOND but denied by CULVER (*vide infra*). With this doubtful exception and possibly a case from West Africa referred to by SAXBOA in a private letter pellagra had never been recorded in Africa except from the Mediterranean area until H. S. STANNUS described in 1911 (1912) an outbreak which he had had under observation during the previous year among the inmates of the Central Prison at Zomba Nyasaland. Two years later in a second communication STANNUS (1913) gave a fairly full account of the disease and established the fact that a maize diet was not an essential factor in the aetiology of pellagra.

Soon after these earlier observations upon pellagra in African natives P. A. NIGHTINGALE published (1912) an account of an outbreak of what he called Zeism, to distinguish it from pellagra, among the inmates of the Victoria Gaol, Northern Rhodesia. Some 40 cases occurred among men whose main article of diet had been changed from rapoko (elephant) to steam milled maize meal. When a return was made to the previous dietary the cases recovered and it was stated that no recurrence took place the next season.

NIGHTINGALE described the typical rash of pellagra, the typical affection of the tongue and lips etc. but in ignorance of that disease he failed to recognize pellagra though others who read his account including SAMBON (1913) immediately did so. NIGHTINGALE made a second communication two years later (1914).

J. DRUMMOND (1913) published the case of a tuberculous Kaffir admitted to the Addington Hospital Durban, suffering from pellagrous rash and tongue spasmic diarrhoea and albuminuria, emaciation marked inco-ordination, loss of reflexes accompanied by delusions.

He mentioned that Dr. ADISON had told him that he had seen numerous cases among rebel Zulu prisoners in the 1906 Natal rebellion. E. H. CLOVER (*vide infra*) refers to a communication from Dr. L. G. HAYDOV who put the number of cases at 150. Dr. KNIGHT also stated that he had seen cases in 1907 which closely conformed to the description of pellagra, in the Tugela Valley they all died.

In 1912-13 an outbreak of pellagra occurred among the inmates of a mental institution at Pretoria but an account of the outbreak did not appear until the publication of the Annual Health Report Union of South Africa June 1928. There were 60 patients 15 of whom died (1928).

skin manifestations and diarrhoea were the most prominent symptoms together with neuritis of very variable severity. Three cases were reported, but not all published, by BARCROFT ANDREWS in East London gaol in 1913, 1914 and 1915—they are referred to by Cluver (*vide infra*).

The case reported by J. A. MITCHELL (1914) a Transkei native transferred from East London prison to Cape Town gaol with hemiplegia, neuritis and scaly anaesthetic patches of dermatitis on the face, back, buttocks, forearms and legs, oedema of feet, spongy gums and tachycardia may have been a case of pellagra but it is much more suggestive of leprosy, in spite of a negative nasal swab.

E. W. D. SWIFT & H. E. BROWN writing in 1914, stated that Dr MACFARLANE remembered seeing five cases presenting symptoms of pellagra among the Basuto in 1906-7 and that in the Bloemfontein Asylum six cases were called to mind as having had signs of the disease during the eight years ended 1914.

These authors very truly remark "In Africa, therefore, ability to recognize the disease has played a large part in extending our knowledge of geographical distribution."

This phrase would have been even more true had it been stated conversely.

In 1920 DRUMWOOD recognized another case of pellagra in Durban. He made enquiries throughout the Union of South Africa but could hear of no other case at that time. He saw yet a further case in 1922. These were the first Europeans to be so diagnosed in South Africa. But the same year PIPPER (1922) reported having seen two similar European cases on the Witwatersrand. He remarks that although maize is the staple diet of a large proportion of natives in South Africa, pellagra is unknown.

A. J. ORENSTEIN in an investigation among miners on the Rand in 1927 discovered one European and one native case. The same year ROSS & RHODES made a diagnosis of pellagra in an Amatikulu native supposed to be suffering from leprosy and three native cases were reported from the Addington Hospital, Durban.

In 1928 seven further native cases were diagnosed in the Addington Hospital, one was reported in the Krugersdorp gaol and one in the Queenstown municipal location in reply to a questionnaire sent to twenty-one District Surgeons attending prisons. These various cases are mentioned by E. H. CLUVER (1929) who further reports upon the outbreak of Pellagra in the Durban Prison Command when 64 cases were under observation, two had symptoms on admission, 25 within three months of admission, 10 in between one and two years, 13 in periods of two years. The diet which was deficient in protein, fat and carbohydrate, consisted of mealie-meal, rice, meat or beans, vegetable soup, bread and soup. Cluver asks why did pellagra break out in the Durban prison and not in other persons under similar conditions and finds no answer except to say that exposure to sunlight (Durban is in the subtropics) is known to be a contributory cause of pellagra, especially when associated with hard work."

It is pointed out that natives living on a diet which might well be considered as prescorbutic only develop scurvy when given the same diet in prison and it seems probable that the same is often true of natives who come into the gaols in a sub-pellagrous state. Unfortunately the symptomatology in this outbreak is not dealt with and nothing further can be said about it.

In 1924 T. D. NAIR reported the case of a 35-year old Indian in Kenya suffering from recurring attacks over three years of a pellagrous-like rash, increasing in severity associated with soreness of the tongue, intolerance of light burning sensations, weakness, vertigo and irritability and pain in the back and legs.

The same year F. H. COOKE (1924) published a short note upon a case in the convict prison at Accra Gold Coast a male aged 30 convicted nine months before. Five months later he was treated for diarrhoea and indigestion followed by burning and tingling in hands and feet the diarrhoea returned, he lost appetite and became emaciated. Later still the dermatitis appeared on the dorsa of the hands and feet forearms and face and pains in the back and head were complained of. The man was a clerk in a European firm and could afford to live well. Nothing is said of the after history and no mention is made of the prison diet. No other cases were noted at the time.

In 1928 A. J. BOASE refers to 10 cases of pellagra discovered among native prisoners at Lira in Uganda, associated in two cases with xerophthalmia. As a result the malady was sought for in other prisoners in Uganda. 17 cases were found at Kampala and seven at Entebbe. The outbreak occurred it was considered as the result of the prison diet which consisted almost entirely of maize and beans vegetables having been cut off the previous year.

The symptoms were typical and resembled those described by STAMMUS—rash, sore tongue and soreness at the angles of the lips (here described as leucoplakia) seborrhoea about the nose diarrhoea and psychosis. Pricking and burning of the feet were complained of.

After the restoration of vegetables and the addition of meat to the diet pellagra it is stated was banished.

The disease had not been previously recognized in Uganda but it is worthy of note that in 1924 J. P. MITCHEL had signalled an outbreak of what was called a scurvy like condition, with oedema and watery diarrhoea among prisoners at Lira and Kampala which cleared up when meat and vegetables were added to the diet. A similar outbreak had also occurred in 1919 at Mbale prison.

A MCKENZIE (1930) refers to the fact that in Tanganyika Territory one case only of pellagra had been recorded in the ten years 1919–28 and then reports four cases from the Songea district jail where the average number of inmates was seventeen whose diet consisted of whole maize 2 lb beans 5 oz. oil or ghee $\frac{1}{2}$ oz. salt $\frac{1}{2}$ oz. Little is said of symptoms but it was considered that they responded to the addition of meat yeast and spinach to the dietary. The patients had been in the prison one two one and five months respectively.

In 1933 Dr Cecily WILLIAMS gave an account of a very interesting condition met with at Accra on the Gold Coast under the heading A nutritional disease of childhood associated with a maize diet. The syndrome to use her own words consisted of oedema, chiefly of the hands and feet followed by wasting diarrhoea, irritability sores chiefly of the mucous membranes and desquamation of areas of skin and was due it was believed, to an improper diet containing an excess of maize. Such a group of symptoms is certainly suggestive of pellagra and when the symptomatology described is studied in greater detail a diagnosis of pellagra would seem to be inevitable. Miss WILLIAMS however came to exactly the opposite conclusion and gave a number of points in differential diagnosis from pellagra. Each of these points

was however based upon a lack of appreciation of the symptomatology of that disease as pointed out by STANNES (1934). In 1933, however Miss WILLIAMS under the title "Kwashiorkor" published a second article covering practically the same ground and repeating the same errors as an article which drew from STANNES (1933) even more severe criticism.

These children presented some oedema of the extremities, a typical pellagrous dermatitis of areas of skin subject to trauma, with hyperpigmentation and desquamation—the extensor surfaces about the knees, ankles, wrists and elbows were affected, and sometimes the thighs and buttocks. Stomatitis and vaginitis were noted and the angles of the mouth and eyes were involved. Diarrhoea and mental irritability completed the picture of pellagra. Ninety per cent. of the children died.

It is worthy of note however that among some of the older children who recovered, relapse occurred. The condition had been seen most in children between the ages of six months and four years—six weeks and five years being the extremes of age in these cases. They had been ill fed and given a gruel made from partially fermented white maize. Malaria, bronchitis and helminth infections were commonly present. A trace of albumen was found in the urine of some cases but there was no anaemia.

These are I think one may say, obviously cases of pellagra in children.

In 1935 Mr Dyce SHARP described a case which he recognized as similar to that portrayed by Dr. WILLIAMS but he also failed to realize the close similarity or identity with pellagra and believed the condition constitutes a disease sui generis" and that there was no evidence of an avitaminosis. In his case there were mental irritability, oedema of hands and feet, enteritis, dermatitis above the wrists and ankles, at the knees, ankles and buttocks—all areas of pressure as he points out, while failing to recognize that this occurs typically in pellagra. There was also stomatitis but no anaemia, and no albuminuria—the reflexes were normal.

J. F. CARMAN (1935) in a letter referring to the cases described by Miss WILLIAMS and by Dyce SHARP states that a similar affection occurs in Kenya among the Kikuyu children aged 1 to 4 years. The symptoms are oedema of the feet and legs, hands and arms, of the body including the face associated with bronzing of the skin and patchy desquamation. Diarrhoea is inconstant, albuminuria not present in all the children so affected died. He refers to the first case shown by Dr. SHAW at Nairobi and to those observed by R. U. GILLAX (1934-35) and by D. V. LATHAM (1935). GILLAX's cases were mostly breast fed Kikuyu children 3-4 years of age but several cases had been seen among adult females. The outstanding feature was marked oedema extending to the whole body which pitted on pressure.

There was a history of diarrhoea in most cases and the symptoms in some had been present for seven to nine months. In three of the twelve there was marked tachycardia, in one enlargement of the heart, pain on movement of the legs was marked, a considerable degree of anaemia was noted but stomatitis was not seen. The condition was considered by the author to be an infective one. While it is difficult to offer any very definite opinion upon the nature of these few cases, the condition would appear to be more closely allied to child beriberi. It does not resemble very closely that described by Miss WILLIAMS. A somewhat similar single case has been recorded by A. SWARRECK (1932). A girl,

8 years of age met with near the southern border of Abyssinia exhibiting anasarca ascites albuminuria and anaemia a dry scaly skin with purpura areas spongy bleeding gums and dilated heart, which responded to a diet of vegetables fruit eggs milk and meat. The natives recognized the sickness as one usually occurring in outbreaks and then invariably fatal. The author considered the case to be one of scurvy. The ordinary diet of these natives consisted of cows milk the pasturage being very poor.

Further references will be made later to the outbreak of pellagra described by STANVUS also to pellagra among the Turkish prisoners of war in Egypt described by BIGGAR and to the pellagra recorded by COKKIL among Sudanese millet eaters.

Search through the Annual Medical Reports of our African Colonies yields the following information in regard to cases of pellagra diagnosed. Gambia (1933) 10 Kenya (1932) 2 Nyasaland (1932) 88 in prison, 8 in Asylum, 5 in Hospital (1933) 10 N Rhodesia (1932) 12 in Broken Hill Gaol (1933) 6 Zanzibar (1933) 16 Basutoland (1933) 3 Bechuanaland (1933) 1 Swaziland (1931) a pellagra like condition is noted.

Pellagra is not mentioned in the reports for Lagos Sierra Leone (1932) Nigeria (1932) Tanganyika (1932) Somaliland (1928) Mauritius (1932) Seychelles (1931).

One would not be surprised however if these figures were found to give a completely erroneous picture of the distribution of pellagra.

INDIA.—J C D MEGAW & J C GUPTA (1927) in an article upon the geographical distribution of some diseases in India basing their opinion on the replies made to a questionnaire sent to civil surgeons say of pellagra there are only four doubtful cases from Lyallpur and one well authenticated case from Calcutta by Col. CALVERT and one other possible case at Natore from Col SANDES. It is interesting to note that in a later paper MEGAW (1936) gives the figure for cases of night blindness in India at three and two-thirds millions more than twice the number of cases of pulmonary tuberculosis. The figures given by MEGAW & GUPTA most assuredly give no idea of the incidence of pellagra in India. The probability is that when pellagra is unsuspected and when there are few able to recognize the disease many cases go undiagnosed.

A. SWARUP (1930) has described a typical case of pellagra from Ballia, United Provinces. The patient was a non maize eater and rarely partook of meat or fish. The typical affection of the skin was associated with pyorrhoea stomatitis erosions at the angles of the mouth, tremor of tongue giddiness sleeplessness pins and needles in the hands and feet exaggerated knee-jerks and diarrhoea with a seasonal variation in symptoms.

In 1931 and again in 1933 J. LOWE has described an outbreak of pellagra among the inmates of the Leprosy Hospital at Dichpali, Hyderabad Deccan. The disease was first noted in 1925. Twenty cases were diagnosed in the next six years eleven women and nine men though the proportion of female inmates to male was as 1 : 4. The ages were from 14 to 40 years. In 1931 twenty fresh cases occurred.

The skin manifestations etc. were typical including the affection of the genitals and stomatitis in 50 per cent. but, except in seven cases intestinal disturbances with diarrhoea were uncommon. In the same way nervous and mental symptoms though typical were not common. Signs appeared in December reached a maximum in March and then cleared in April.

Fatal termination was associated with myocardial fibrillation, tachycardia, dyspnoea and oedema of the feet. The diet provided by the Mission which looks after the Leper Hospital consisted of 1 kg unpolished rice & a chapati of jawari (millet) flour, salt, ghee and one rupee a day to purchase dhal, meat, fish or vegetable, if any available.

Lowe thinks that though such a diet shows a marked deficiency in protein and an excess of starch it is much the same as that taken by the population outside the institution and believes that this points to some infection as the cause of pellagra.

T. K. RAMAN (1933) has published notes of four typical cases of pellagra at Guntur and remarks that no cases had been previously reported in the Madras Presidency.

B. H. RAJADHAKSHI (1933) similarly notices a case in Bangalore.

S. N. GUPTA (1935) a case at Lahore—female aged 20 who had fed on wheat, fruit, vegetables and ghee. The rash appeared on the hands, feet, forearms, legs, elbows, nose, cheeks and neck—the skin was dry and thickened. Diarrhoea, mental depression and marked anaemia completed the picture.

G. PANJA (1933) also cites a case in Calcutta, and N. S. H. MEST (1935) one at Poona very similar to that described by GUPTA.

CEYLON.—Pellagra is said not to occur in Ceylon. L. ALEXANDER (1934) who gained acquaintance with the disease in the West Indies stated that he had searched for cases of pellagra in the Ceylon prisons, vagrant asylums, poorhouses, etc. in vain.

RUSSIAN TURKESTAN.—A. J. WYJASOWSKI (1934) records twenty cases of pellagra seen at the Psychiatric Hospital, Tashkent, of whom more than half died. In the same city J. KASINSKI & L. BOROVA (1932) have had under their care in the clinic for Tropical Diseases forty-eight cases of pellagra. There was a mortality of 25 per cent, and of those who improved with better diet 30 per cent. recurred the following spring.

CHINA.—S. R. ROBERTS (1912) quotes W. H. JEFFRIES as replying to a letter of enquiry to the effect that pellagra had never been reported from that country. He very wisely adds that this does not mean that the disease may not be present as he has been misled so often and further "I do not think that the average surgeon or physician could recognise pellagra unless on the lookout for it, or unless its great prevalence as a disease should force his attention." The first cases actually to be reported were four in number from Szechuan, Western China, by H. JOUVEAU-DUREUIL (1919).

Since then a number of observations have been published and it may be of interest to summarize here some of the findings in regard to the disease as seen in the Far East. E. S. TYAU (1933) makes the interesting observation that among some 6,000 cases that had passed through the skin clinic at St. Luke's Hospital, Shanghai, in the previous eight years none has ever been suspected of pellagra, but that in the next year six cases had been recognized. All were males over forty years of age belonging to the poor working class, living on rice. The skin of the backs of the hands, and of the cheeks was dry, thickened, rough and darkly pigmented. The tongue was dry and painful with reddened edges, there were aphthous ulcers on the fingers, loss of appetite, abdominal pain and diarrhoea, burning sensations in the soles of the feet and later nervous symptoms and fatal termination.

S C Wu (1923) refers to the first case ever observed at Wuhu a male 36 years of age boatman. His illness began with burning sensations in both hands followed by dermatitis of the backs of the hands and round the wrists and both feet and later desquamation. There were also affection of the tongue and lips loss of appetite abdominal discomfort and diarrhoea numbness over the upper and lower extremities and chest and lost reflexes. His diet consisted chiefly of rice vegetables and only occasionally fish never meat.

Mu Jui Wu (1927) of Peiping relates the case of a soldier one and the only one of a party of ninety to develop the disease. They all partook of the same diet of rice cabbage bean-cure bean-sprouts spinach and turnip but seven months before being seen the patient had changed the diet to one consisting of mullet and after two months maize with turnip cabbage and spinach. His chief symptom was an intolerable creeping sensation in the legs with weakness. The dermatitis affected the hands wrists fore-arms and neck the tongue was glossy but there was no stomatitis a seborrhoeic affection of the skin of the face was noted. Symptoms cleared up when given a full diet and hydrochloric acid. Seven other similar cases were recognized later.

A. C. LAURENT (1927) has published a case of pellagra in a Chinese woman at Honan suffering from a recto-vaginal fistula who had lived on wheat meal and vegetables only. She presented the typical affection of the skin and tongue associated with diarrhoea and nervous symptoms.

C. S. YANG & C. K. HU (1930) have described three interesting cases at Peiping. The first was a male aged 42, complaining of twelve months diarrhoea following an attack of dysentery progressive weakness and numbness of the lower limbs. Examination revealed a palpable spleen absent knee jerks marked anaemia red cells two millions and haemoglobin 32 per cent hypochlorhydria, a normal urine extensive ulceration and polyposis of the rectum, a pellagrous rash on the hands nose and cheeks of six months standing and a fissured tongue the stool was negative for *Bacil dysenteriae*. The diet had consisted practically entirely of cereals. When he was placed on a full diet the skin lesions disappeared and the haemoglobin rose to 82 per cent. The second case was a 14-year old servant girl the subject of pulmonary tuberculosis who had existed on a diet of cereals and vegetables. A typical rash on the backs of the hands was associated with diarrhoea. At the time she was seen the skin was still sensitive as a small dose of U V radiation on the abdomen caused an erythema to appear. The third case was a 24-year old male who had had chronic diarrhoea for over three years and had lived on cereals green and salted vegetables. For eight months a pellagrous eruption had been present on the backs of the hands, forearms back of the neck face and sternum. There were also loss of weight and diminution of patellar response, but no anaemia and no other symptoms amoeba, ascaris and monilia infections present. Treatment with emetine E.B.L. yatren, hydrochloric acid and a full diet was instituted and the skin lesions almost disappeared but the patient died a few days later extensive ulceration of the bowel being found at necropsy.

C. S. YANG & K. K. HUANG (1934) describe 30 cases of pellagra among soldiers in an army camp at Nanking. The eruption was typically on the hands in 27 the mouth or tongue was affected the tongue raw and the papillae red and swollen. Associated symptoms consisted of giddiness and irritability but no frank mental symptoms numbness

and weakness of the lower extremities, pain in the calves on pressure, loss of muscle tonus and oedema in a few, variable knee-jerk, scalding darting pains and pins and needles in the soles of feet. Blurring of vision with reduced fields and night-blindness occurred in 25. In one case retrobulbar neuritis was noted. A folliculitis was present in the anterior part of the trunk. Diarrhoea was not present but there was often a history of it. Rectal examination revealed in a number of cases a proctitis. It was noteworthy that 29 of the 30 cases occur in a cavalry camp and only one in the artillery camp. The diet in rice 200 catties, wheat flour 150, turnip 52, green cabbage 7, green bean 10, vegetable oil 4, pork 3, was low in protein and high in carbohydrate.

H. Y. Yu (1934) describes the first three cases of pellagra in Manchuria. Typical rash was associated with raw and furred tongue, wasting, vulvitis and soreness at angles of mouth and about the nose, dizziness, epigastric pain, pyrosis, diarrhoea, pain in the back, diminished knee-jerk, some oedema of legs and mental depression. The diet consisted of practically nothing beyond millet, with or without salted vegetables and bean-sprouts. In one case there was active pulmonary tuberculosis.

KOREA.—R. M. Wilson (1925 and 1933) gives an interesting account of an outbreak of pellagra in Leper Asylums in Korea, he being anxious that the disease had been ever reported before from Korea or China, and certain that he had never seen the disease in the previous seventeen years. In 1925 lepers in the Kuangju Colony with 600 inmates, began to complain of a brown scaly exfoliative rash on the arms and legs, like an iodine burn which disappeared in the winter to reappear in the spring. The relative frequency of symptoms was: scaly skin 77, erythema 15, stomatitis, sore gums and red tongue 15, nausea and vomiting 15, gastro-intestinal upsets 12, bloody stools 8, malnutrition 9, headache 13. Referring to the colony at Fusan in 1933 Wilson says "the red disease" has become very common both there and at Soochuan.

The exanthema was typical, affecting hands, neck, ankles, face etc., associated at first with constipation and then with diarrhoea. These symptoms were not marked and in only three was there insanity. In all there were six males and 30 females affected, some died but the number of deaths was not recorded. Relapses up to seven years had been noted. A questionnaire was sent to other Mission doctors in Korea; nine had not recognized pellagra, three had done so. K.S. Ong (1931) had records showing two cases of true pellagra, and 18 cases of pellagra-like [sic] in twelve years, otherwise the disease had not been seen outside institutions, though, it is stated, a pellagra-like condition had been observed among chronic alcoholics and in some suffering from tuberculosis or other chronic illnesses in which diet and food absorption were at fault. Such cases are, of course, in reality pellagra.

The diet of these leper cases was a poor one, consisting of rice, vegetables, some beans and barley. It is rather remarkable that cases were said to improve when pork or cod-liver oil was added to the diet. Probably the rash would have improved in any case.

JAPAN.—M. Itoh (1925) refers to pellagra in Japan. He has collected references to sixty cases and himself has seen twelve cases. They were found on the main island, in Korea and Formosa, practically none in the north island. They occurred among ill-nourished workers

living on a polished rice diet and were cured by giving rice husk. Of the sixty 27 had diarrhoea 18 stomatitis and indicanuria 8 psychosis many had signs of a peripheral neuritis in 19 resembling beriberi.

S TAKAHASHI *et al* (1929) state that over seventy cases of pellagra have been recorded in Japan. They give an account of four fresh cases seen at Hokkaido three females aged 41, 45 and 54 and one male aged 43. They were typical cases with a history of gastro-intestinal disturbance. In one woman carcinoma of the pylorus was present.

PHILIPPINE ISLANDS — J N RODRIGUEZ (1930) has published a case of pellagra from the Philippine Islands and refers to one observed by D D Willets in 1910. The patient was a maize eater a moderate taker of tuba but seldom got meat chicken or eggs and never milk. The illness began with pain and diarrhoea and the passage of tarry stools. He became very weak and thin, and developed an exanthem on the hands forearms nose forehead and cheeks with burning sensations and what is called a prickly seborrhoea. The tongue was sore and red at the tip and borders. Later the man became liable to depression or excitability.

T DYCHITAN (1930) describes a condition called Lapnus a common affection in the island of Mindoro Philippines which he thinks is pellagra.

It prevails from March to August and disappears in September and has a mortality of 50 to 60 per cent. Burning of the soles of the feet is a prominent symptom followed by the development of a purplish blue colour later on a gray colour and cornification then peeling of the skin. Other symptoms are stomatitis gastralgia and pyrosis pains in bones formication in, and weakness of the lower limbs increased knee-jerk mental apathy and melancholia. Opacity of the cornea sometimes occurred. One would agree obviously pellagra.

SIAM.—R W MENDELSON (1919 and 1923) writing of Siam believed that no cases of beriberi or pellagra had been reported from that country. He then describes a police recruit aged 27 suffering from a raw red tongue dermatitis affecting the dorsa of the hands and feet and scrotum associated with diarrhoea the gait of polyneuritis diminished knee-jerk but no oedema. MENDELSON suggests it was a case of mixed pellagra and beriberi but there seems little reason to believe it was anything more than a case of the former.

MALAY.—As far as I am aware no outbreak of pellagra has ever been recognized as such in south-eastern Asia and it has sometimes been said that pellagra does not occur. That the disease often goes unrecognized is very probable and borne out by the statement made by W S SHEPPARD of Singapore (1912). Until he had learned to recognize the disease cases were labelled a hitherto undescribed form of superficial dermatitis probably tropical in origin, and one of his colleagues who had practised in the East for twenty years told him he had not infrequently noticed similar skin lesions without recognizing them for what they were namely pellagra.

SHEPPARD remarks that during the years 1903 to 1907 he was constantly seeing cases in his wards at Singapore. He also notes that they came from the poorest classes and that they were rice eaters. J V LANDOR & R A PALLISTER (1935) to whose observations reference will be made later state that sporadic cases of pellagra do occur among the general population of Malay and cite in brief three cases.

A. VISWALINGAM (1917) referred to the first case of pellagra seen by himself in Perak. He made other references to pellagra the next year (1918) at the Sixth Congress Far Eastern Association of Tropical Medicine (1925) and again later (1929). He discusses cases of pellagra occurring among Chinese and Indian labourers.

Attention is called to the characteristic symptom of "burning feet" called in Chinese "pee". The typical rash was associated with stomatitis, raw tongue, soreness at the angles of the mouth, diarrhoea, anaemia and weakness in the limbs, oedema, absent knee-jerks and melanoderm. He believed that the disease was due to a monotonous diet, deficient in vitamins poor in protein with excess of carbohydrate, such a diet as the native takes—polished rice salt dried fish, pork fat, tubers, rice fresh or preserved leaves with stale vinegar as a sauce. His theory is that many patients as the result of malaria, dysentery and amoebiasis suffer from defective digestion prolonged dietary deficiency leads to an intoxication which causes pellagra.

Returns for pellagra in the Annual Medical Reports are as follows: Strait Settlements (1932) 2 Hong Kong (1932) 24 Chinese Singapore (1933) no mention Johore, Kedah, Penang, Kelantan (1932) no mention Federated Malay States (1933) none.

PAPUA.—W. M. STRONG (1932) mentions a number of cases of keratitis and panophthalmitis with night-blindness and signs suggestive of beriberi and scurvy among natives in a large centre of native employment but no details are given. It would have been interesting to know if any of these cases resembled more closely pellagra.

DUTCH EAST INDIES.—W. G. BOSCH (1931) reports a single case of pellagra in Java, and C. D. DE LANGEN & B. DJOGA (1933) a case in Sumatra (Batavia) a typical case in a male native aged 50, with exanthem, glossitis, mental depression, slight oedema of legs and marked anaemia.

SANDWITH cited NEIRET as reporting pellagra in New Caledonia.

AUSTRALIA.—S. J. CANTOR (1927) of Melbourne has published an account of five cases of pellagra in which the diagnosis rested upon a typical rash associated with mental symptoms. In one of the two adult cases it is noted that the scrotum was also involved. N. PACI (1928) of Sydney also reports a case of the disease, a man aged 48 who was edentulous and had lived for years on farinaceous foods and beer. He suffered from flatulence, dyspepsia and constipation, mental instability, nervousness and depression, weakness and vertigo, soreness at the angles of the mouth, an ulcer on each eye, and a characteristic dermatitis on the hands, forearms, face and neck, which had recurred each summer for five or six years.

CENTRAL AMERICA.—Pellagra was reported in Mexico by D. NOGUERA in 1882. Mortality statistics for Mexico quoted by S. R. ROUZZI (1919) returned one death from pellagra in Mexico City in 1909 and one in Monterey City in 1910. R. ROUZZI (1931) states that the disease is common among the half breeds of the province of Yucatan, who subsist on a deficient nourishment together with alcohol. At Merida with a population of 80,000 the deaths from pellagra have been 1911 49, 1912, 71 1913 23 1914 81 1915 70 1916 91 1917 72 1918, 29 1919 23 1920 21. GAUMER went so far as to say that 8 to 10 per cent. of the population was affected.

J. L. PHILLIPS also cited by ROBERTS refers to pellagra in the Panama Canal Zone and says that in the years 1909-11 32 cases had been diagnosed with 16 deaths.

Of the incidence of pellagra in South America little is known.

WEST INDIES.—The Annual Medical Reports make returns as follows: Trinidad & Tobago (1933) 1 St. Christopher & Nevis (1932) 1 St. Lucia (1933) 2 St. Vincent (1933) 0 Antigua (1933) 2 Dominica (1933) 0 Jamaica (1932) a few deaths from pellagra occurred. Bermuda (1932) 0 Barbados (1932-3) 100 Virgin Islands (1933) 0 British Honduras (1933) 1 British Guiana (1932) 0 may also be mentioned here.

In the 1932 Report for Bahamas the following figures are given for the years 1928 to 1932 35 86 79 81 61 35 and 27 cases of pellagra.

It is stated that pellagra is always more obvious when the citrus fruit crop fails owing to hurricane.

VELARDE (1932) saw five cases of pellagra among 475 admissions to hospital in twelve months 1931-32 in the Island of Porto Rico.

It is interesting to remember that pellagra in Barbados was first described by C. G. MANNING in 1909 among the inmates of the asylum under the name of *Psoriasis pigmentosa*. The symptoms recounted consisted of a scurfy crusted skin over the points of the knuckles elbows knees and feet (except in those who wore shoes) more rarely on the back and chest accompanied by anorexia, stripping of the mucous membrane of the tongue cheeks and fauces intractable diarrhoea and anaemia. The skin took on a wine stained tint and gangrene sometimes occurred. The patients became silly and half witted but with good feeding milk and cod liver oil recovery took place.

Pellagra was first recognized in Jamaica in 1897 according to D. J. WILLIAMS. In 1905 4 per cent. of the total 1,050 inmates of the Asylum were attacked with Pellagra in our wards. For twelve months no maize foods were allowed into the asylum but persons admitted during that time still got the disease.

RABIES.

A REVIEW OF RECENT ARTICLES. XXX

The rôle of the vampire bat in the transmission of rabies in Trinidad and in parts of South America is the subject of four papers. The first by PAWAX¹, the second by DR VERRILL & UNWIN and the third by METIVIER refer mainly to Trinidad—the fourth by TONKES & LOUIE from South America. In all four papers the conclusion is arrived at that the vampire bat is the transmitting agent in these epidemics and epizootics.

PAWAX¹ first fixed his attention on the examination of bats which showed unusual behaviour and tested these for rabies both biologically and by animal experiment. It is difficult to extract the exact figures from the paper but it may be said that in practically all of the bats examined (roughly 38) there was definite evidence of the presence of rabies virus. Crossed immunity tests were then carried out with fixed virus and bat virus with the result that fixed virus protected against bat virus but bat virus protected only feebly against fixed virus. It was also found that fixed virus antiserum neutralised bat virus. The author then gives details of forty-seven cases of rabies in all except one of which there was a history of bat bite, and draws attention to the fact that in all except one, sensory symptoms at the seat of the bite preceded paralysis and death. He then deals with preventive measures such as bat proofing of stables and dwelling houses and describes the mode of attack of the bat. Finally he draws attention to the comparative rarity of canine rabies in Trinidad as well as in Brazil. Whether this can be explained by assuming (1) that the local virus is innocuous to canines or (2) that dogs are never bitten in their sleep or (3) that the dogs of these countries possess an immunity he is not prepared to say.

DR VERRILL & UNWIN² cover somewhat similar ground. The latter is responsible for the zoological side of the investigation, and the former for the biometrics of the vampire bat (*Dermanura rotundata*). They refer to the epizootics of paralytic rabies reported from Santa Catarina in Brazil since 1908 the transmitter of which was believed by HURST & REHAAG (1921) to be the vampire bat, *Dermanura rotundata* and went on to describe the experience in Trinidad and its experimental elevation by HURST & PAWAX. The characteristics and life history of *Dermanura rotundata* are then described with very interesting illustrations. It appears that the bat grasps the victim by the canine teeth, and with its sharp triangular upper incisors cuts through the skin—the blood is then lapped up, the tongue moving forwards and backwards like a piston. The bats may be destroyed in their feeding grounds, in the places where they digest, or in their roosting places. As regards the first locality advantage is taken of the fact that the bats "have the habit of bur-

For the twenty-fourth of this series see 1938, Vol. 33, p. 318.

¹ PAWAX (J. L.). The Transmission of Paralytic Rabies in Trinidad by the Vampire Bat (*Dermanura rotundata* Wagner 1840).—Jour. Trop. Med. & Parasit. 1938, Apr. 8, Vol. 30, No. 1, pp. 191-199. With 2 maps & 4 figs. on 1 plate. [56 refs.]

² DR VERRILL (Eric) & UNWIN (P. W.). The Study and Control of Paralytic Rabies transmitted by Bats in Trinidad. British West Indies.—Trans. R. Soc. Trop. M. & H. 1938, Jan. 25, Vol. 29, No. 4, pp. 313-337. With 20 figs.

the same animals on the same spots nightly. Strychnine paste is applied to this area and the bats are poisoned with ease. Trapping or fumigation is used in the digesting and the roosting places. The authors then describe experimental work which has been carried out both in Trinidad and in Brazil. Most of this has already been described in these reviews. But one observation emanating from Brazil is worthy of note. Four desmodus bats after inoculation with bovine rabies virus though showing no symptoms of rabies themselves were capable of transmitting the infection to twenty five healthy cattle within one to four months after experimental inoculation. One such bat killed after five months was proved to have its salivary gland infected. The authors rightly conclude that Confirmation of this last experiment would mean not only a new addition to our knowledge of the virus of rabies but would also further indicate the necessity for considering the carrier problem in connection with viruses in general. Usually however the bat dies after a period of a few days during which it has shown a change of habit and has appeared to be restlessly active. The authors believe that the disease is also transmitted from bat to bat basing this conclusion on the occurrence of scars on the heads and bodies of captured bats and upon the fact that when hungry they commonly attack each other. The enzootic may be controlled by bat destruction as described above and for this surveys of infected areas and of roosting places of which illustrations and maps are given are necessary. The possible relation of fruit eating and other bats to the spread of the disease appears to require further investigation.

The paper by METIVIER³ covers similar ground and deals with the veterinary aspects of the problem.

The observations made in Brazil are described *in extenso* by TORRES & LIMA,⁴ and a French summary of this paper appears in another journal.⁵ The larger paper is furnished with beautiful illustrations of the vampire bat and with photographs showing the bat as it attacks various animals. An historical account of the cattle epizootics in Brazil and of the work of HAUPP & REHAAG and others is also given. The experiments cover a wide range and show that the vampire bat is without doubt the transmitter of the epizootics in question the resulting disease being rabies of paralytic type.

1. Virus

The size of the virus of rabies (fixed virus) has been examined by YAOI KANAZAWA & SATO⁶ using the technique devised by ELFORD. The brain of a rabbit killed in an advanced stage of rabies was ground with sand in a mortar and suspended in a suitable diluent (Hartley's

³ METIVIER (H V M.) Paralytic Rabies in Livestock.—*Jl Comp Path & Therap* 1935 Dec. 31 Vol. 48 No 4 pp 245-260 With 7 figs [11 refs.]

⁴ TORRES (Sylvio) & LIMA (Esperidilio do Queiroz) A raiva e sua transmissão por morcegos hematofágos infectados naturalmente.—*Rev Depart Nac da Produção Animal* Rio de Janeiro 1935 Vol. 2 Nos. 1 2 & 3 pp. 1-35 With 25 figs. on 11 plates & 1 folding diagram. [17 refs.] English summary

⁵ TORRES (Sylvio) La rage et sa transmission par les vampires hématophages.—*Rev Gén de Med.* Vol. 1936 Feb 15 Vol. 45 No. 530 pp. 78-84

⁶ YAOI (H.) KANAZAWA (K.) & SATO (K.) Ultrafiltration Experiments on the Virus of Rabies (Virus Flx)—*Japans Jl Experim Med* 1936 Feb 20 Vol. 14 No. 1 pp 73-79 [11 refs.]

broth at pH 7.6). The centrifuged suspension, after filtration through sand and pulp was subjected to filtration through colloidion membrane of various grades under pressure of nitrogen gas. In estimating the infectivity of the filtrates tests were made with ten-fold dilutions of fluid using guinea-pigs. The authors found that at a pH of 7.6 the virus passed through membranes with an average pore diameter of not less than 0.2 μ . "We assume therefore the end point of the rabies virus is 0.2 μ , and regard the particle size of the virus as 0.1 to 0.15 μ .

DEFRIES & CAMPBELL¹ find that the New York strain of fixed virus differs slightly from the Paris strain, both in its minimum lethal dose, and in its incubation period when inoculated into rabbits and white mice. The lethal dose of the New York strain is of the order of one in 10^8 whilst that of the Paris strain is one in 10^4 . The average incubation of the New York strain in rabbits was 10 days, whilst that of the Paris strain was 15 days. In a further experiment it appeared that passage intramuscularly through white mice increased the pathogenicity of the Paris strain.

During the course of experiments on the serotherapy of rabies in mice (this *Bulletin* 1935 Vol. 32, p. 618) PROCA & JANNASCO² found that fixed virus recovered from mice which had succumbed after prolonged incubation appeared to be modified. They have examined two such strains in some detail, and find that they are attenuated and differ from ordinary fixed virus in giving rise to a larger number of IgG bodies. This in their opinion is not due solely to the long sojourn of the fixed virus in the tissues of the mouse. The modification appears to be a true mutation.

BOZZELLI³ in continuation of work already reviewed (ante p. 318) on the effects of inoculation of mixtures of fixed and street virus, comes to the conclusion that fixed virus has lost its proclivity for spreading centrifugally or centripetally along the nerve trunks whilst street virus retains this property. On the contrary fixed virus has an increased elective virulence for the central nervous system.

From experiments conducted by VIOLEZ & LIVROZ⁴ it appears that exposure to 1 per cent. ricinoleate of sodium for 45 minutes at room temperature destroys fixed virus. They now intend to examine the immunizing properties of this killed virus.

REMLINGER & BAILEY⁵ noting this result have tested the effects of the same substance on street virus. The conclusions arrived at from six experiments are identical. This identity of action does not allow one to envisage the possibility of a rapid and easy method of differential diagnosis between the two viruses (diacho-diagnostic).

Following their investigation of the effects of low temperatures on rabies virus (this *Bulletin* 1935 Vol. 32, p. 174) in which it was shown

¹ DEFRIES (R. D.) & CAMPBELL (T. C.) The Relative Pathogenicity of Two Strains of Fixed Rabies Virus for White Mice and Rabbits.—*Canadian Public Health Jl.* 1935 Dec. Vol. 26. No. 12. pp. 615-619

PROCA (G.) & JANNASCO (D.) Sur une modification durable du virus rabique de passage.—*C. R. Soc. Biol.* 1935 Vol. 129. No. 40. pp. 1244-1254

BOZZELLI (Roberto) Contributo allo studio delle "sottilissimi" da virus rabie fisso e di strada.—*Boll. Istituto Superiore di Sanita* 1935 Apr. Vol. 14. No. 4. pp. 260-265 [35 refs.] German summary

² VIOLEZ (Henri) & LIVROZ (Jean) Action du ricinoléate de sodium sur le virus de la rage.—*C. R. Soc. Biol.* 1935 Vol. 129. No. 3. pp. 180-182

³ REMLINGER (P.) & BAILEY (J.) Action du ricinoléate de sodium sur les virus de la rage et de la maladie d'Anjouky.—*C. R. Soc. Biol.* 1935 Vol. 129. No. 16. pp. 24-26

that in frozen condition the virus maintained virulence for at least 600 days and a suggestion by LÉPINE that freezing should be substituted for glycerine in the conservation of cords (*C R Acad Sci* 1935 Vol. 201 p 172) REMLINGER & BAILLY¹² point out that much experimentation would be necessary in order to determine how the various properties of the vaccine were affected. These are being carried out at Tangier.

In the third of a series of articles on Pseudo-rabies (this *Bulletin* 1934 Vol. 31 p 146 and 1935 Vol. 32 p 175) HURST¹³ deals with the disease as it occurs in monkeys. The experiments described in the second of the series were performed on rabbits. It will be remembered that in relation to the rabbit the virus was found to be pantropic i.e. it readily attacks cells derived from any embryonic layer. In the monkey (*Macacus mulatta*) however it behaves as a strict neurotrophe only nerve and glial cells being affected. Intracerebral intracisternal inoculation, and in most instances intrasciatic inoculation led to an infection which was usually fatal. No infection in a limited number of experiments followed intradermal intramuscular or intravenous inoculation. The distribution of the virus after inoculation was carefully followed and the histological appearances of the various tissues studied. Certain cortical areas—the pyniform area, the cornu ammonis, the island of Reil, the lower lip of the sylvian fissure and the basal surface of the frontal lobe were more affected than other parts of the nerve axis. The blood and the cerebrospinal fluid play no apparent part in disseminating the virus. It thus appears that the rabbit and the monkey differ markedly in their relation to pseudo-rabies. The author states that the pig and the monkey are possessed of greater resistance than are most common and domestic animals and points out that in the two groups of animals the mechanism of resistance is wholly different. In the pig a definite local lesion develops associated presumably as in the rabbit with great multiplication of the virus only small amounts are necessary to infect by the skin. During the course of infection the virus is present in the blood lesions may be found in lymph glands, spleen, etc. The mortality rate is less than 5 per cent. Nasal secretions and urine become infective. In short in the pig, the virus exhibits multiple affinities it easily contracts the disease but survives because its nervous system is relatively resistant. In the monkey on the contrary there is no local reaction—intramuscular and intravenous inoculation are ineffective but if the virus enters nervous tissue the nervous system may be invaded, and in many instances the issue is a fatal one. The blood is not infected, and the animal is not infective to its cage mate. There are no visceral lesions. In brief in the monkey the nervous system is probably less resistant to infection than in the pig but since the virus behaves in this species as a strict neurotrophe it does not readily reach the susceptible tissue destruction of which is incompatible with life.

¹² REMLINGER (P.) & BAILLY (J.). La coagulation des moelles rabiques est-elle applicable à la pratique de la vaccination?—*C R Soc Biol* 1936 Vol. 121 No. 15 pp 1614-1616

¹³ HURST (E. Weston). Studies on Psuedorabies (Infectious Bulbar Paralysis, Mad Itch) III. The Disease in the Rhesus Monkey *Macaca mulatta*.—*J. Experim. Med.* 1936 Mar 1 Vol. 63 No. 3 pp 449-463 (With 6 figs. on 2 plates).

The first section of a paper on Aujeszky's disease by GERLACH and SCHWEINBURG¹⁴ already reviewed (*ante p. 320*) now appears in another journal. The second section¹⁵ appears in the *Wiener Klinische Wochenschrift*. This deals with the influence of physical and chemical agents on the virus. It is filterable, passes through Chamberland bougies L, L₁ and L₂, but not through Berkefeld V bougies, nor collodion membranes. It is in general rather less resistant to drying and chemical agents than are other viruses. It differs markedly from rabies virus in that on subpassage through guinea-pigs the incubation period gradually increases until finally the virus becomes avirulent. In twenty instances transference to a cagemate took place without evidence of wounding. Thus it is beyond doubt that transference by simple contact can occur. Only exceptionally has infection followed biting. The authors have succeeded in conveying the disease to rabbits by subcutaneous and intra-muscular inoculation by saliva of a cow suffering from the disease. Crossed immunity does not differentiate the virus from rabies virus.

The occurrence of two cases of Aujeszky's disease in cattle in France is reported by CERVANTIER, TRUCHE & VIALA.¹⁶ These were characterized by sudden onset and rapid course, shortness of the period of paralysis and extreme pruritus.

II. Symptomatology

The case of a man bitten by a dog suffering from "chien fou" which occurred in the Oubangui (West Africa) is described by LE BOURG.¹⁷ The only unusual symptoms were an absence of deep sensation, and diminution in the tendinous reflexes.

A case of hydrophobia which occurred after treatment, during the course of an attack of malaria is discussed by LÖCK.¹⁸

DE MELLO¹⁹ describes two cases of rabies, in the first of which the symptoms were those of an ascending paralysis, and in the second the clinical picture was of the usual type.

III. Pathology

The observation of QUAST (this *Bulletin* 1928 Vol. 23 p. 693) that after a course of treatment with living fixed virus, the virus was still present in the brain in a latent condition without causing any symptoms of rabies has been the subject of much controversy. Some writers

¹⁴ GERLACH (F.) & SCHWEINBURG (F.). Experimentelle Untersuchungen über die Aujeszky'sche Krankheit (Pseudorabies). I. Mitteilung.—*Ztschr. f. Hygiene u. Exptl. Medizin* 1933 Vol. 48 No. 4 pp. 270-283. XII. 17 figs & 8 charts [83 refs.]

¹⁵ GERLACH (Franz) & SCHWEINBURG (Fritz). Experimentelle Untersuchungen über die Aujeszky'sche Krankheit (Pseudorabies). II. Mitteilung.—*Ztschr. f. Hygiene u. Exptl. Medizin* 1936. May 1 Vol. 49 No. 18. pp. 331-334.

¹⁶ CERVANTIER (L.), TRUCHE (C.) & VIALA (C.). Note sur deux cas de maladie d'Aujeszky observés en France.—*Arch. Inst. Pasteur* 1938 Apr. Vol. 56 No. 4 pp. 385-400.

¹⁷ LE BOURG (A.). Un cas de rage humaine dans l'Oubangui.—*Arch. de Mal. de l'Homme et de Pharm. Colon.* 1933 Oct.-Nov.-Dec. Vol. 21 No. 4 pp. 1073-1079.

¹⁸ LÖCK (O.). Zur Kasuistik der antirabischen Impfungen.—*Ztschr. für Medizinische Epidemiologie und Parasitologie* 1933 Vol. 14 No. 4 [In Russian pp. 417-418. German summary p. 418.]

¹⁹ DE MELLO (A. L. Nobre). Sobre dois casos de rabi humana.—*Folia Med.* 1936 Jan. 5 Vol. 17 No. 1 p. 1.

support QCAST others have failed to find evidence supporting his contention. It is important for the diagnosis of the type of rabies from which a patient has died, to ascertain whether the presence of a virus which behaves on subpassage as a fixed virus is indicative of death from the fixed virus used in the treatment or whether it is merely the indication of a storage of latent fixed virus in the sense of QCAST.

BESSON²² now reports two cases amongst rabbits (previously infected with syphilis) in the brains of which, when the animals were killed twenty-eight and thirty-five days after the completion of treatment by HOOVES living virus fixed virus was proved by further passage to be present. These rabbits had shown no symptoms of rabies. A number of other rabbits had been similarly treated, and these gave a negative finding. BESSON consequently believes that the transmission of fixed virus to the central nervous system as a result of treatment is not a normal occurrence. He is not convinced that the virus found was innocuous. The incubation periods on subpassage were long and it is possible that the rabbits though showing no symptoms at the time when they were killed, would have developed rabies later. The conditions under which the fixed virus penetrates into the central nervous system depend in his opinion upon idiosyncrasies in the patient on the one hand, and upon the character of the vaccine on the other.

JOVESCO²³ describes a further case of natural immunity in the dog (this *Bulletin* 1935 Vol. 32, p. 609). He believes that the resistance is due to the destruction or the attenuation of the virus by contact with living nerve cells although the formation of antibodies and the action of leucocytic enzymes appear to play a part.

IV. Methods of treatment and statistics

A sixth review of statistics furnished to the League of Nations by the different institutes is submitted by MCKENDRICK.²⁴ The main fact which emerges is the remarkable degree of homogeneity indicated in the following Table, which includes statistics compiled from the series of six reviews.

From an examination of this Table it appears that the numbers in the non-European group (for which the percentage mortality is 0.72) are in general insufficient to detect superiority of one treatment as compared with another when the excess relative efficiency of the better treatment is about 10 or 15 per cent. whilst in the case of Europeans (for which the average mortality is 0.16) the corresponding figure is about 25 per cent. It is thus reasonable to conclude that it is unlikely that a difference of efficiency of more than 25 per cent. between any two methods of treatment exists. Thus the conclusion is arrived at that the figures so far available are not yet sufficient to detect the existence of differences of less than 25 per cent. It may at first sight seem surprising that figures amounting in all to about half a million

²² Besson (B.) Das Uebertragen und die Speicherung von Virus fixe im Zentralnervensystem geheilster Menschen und Tiere.—*Ztschr. f. Bak.* I. Abt. Orig. 1935 Dec. 9 Vol. 135 No. 6 pp. 331-341

²³ Jovescu (Démétre) Contribution à l'étude de l'immunité naturelle du chien contre la rage.—*C. R. Soc. Biol.* 1935 Vol. 121 No. 12 pp. 1203-1205

²⁴ McKendrick (A. G.) A Sixth Analytical Review of Reports from Pasteur Institutes on the Results of Anti-Rabies Treatment.—*Quarterly Bull. Health Organisation League of Nations* Geneva 1935 Dec. Vol. 4 No. 4 pp. 732-783

	Number treated	Deaths		Mortality per cent.
		Observed	Calculated*	
Europeans				
1 Cords	40,522	68	68	0.17
2 Dilutions	43,218	85	71	0.20
3 killed phenol	34,034	51	59	0.15
4 Live phenol	2,263	5	4	0.22
5 Fermi's vacc	5,123	12	8	0.23
6 Ferrai aero-vaccine	253	0	0.4	0
7 Heated vaccine	67,694	120	111	0.18
8. killed ether	46,547	65	78	0.14
9 Mixed	41,358	51	68	0.12
10 Latren	5,284	13	9	0.4
	258,373	488	489	0.17
Non Europeans				
1 Cords	33,915	223	244	0.66
3 killed phenol	183,786	1,353	1,334	0.73
	219,631	1,576	1,578	0.71

Calculated from the average mortality

are insufficient to demonstrate differences of this order in the efficiency of various methods of treatment. The controlling factor is the mortality rate—the lower this may be, the greater the number of patients required to demonstrate variations. In the case of rabbis [statistics] as shown above the mortality rate [amongst the treated] can be as low as 0.18 per cent." It appears also that the liability to paralysis accident is 1 in 10,372 in the case of those treated by killed vaccines, as compared with 3 in 2,632 amongst those treated by live vaccine, and 1 in 11,637 amongst those treated by heated vaccines (Babes).

The statistics for the Instituto Camara Pestana (Lisbon) for the years 1921-34 are considered by PEREIRA DA SILVA.¹⁰ During this period four different methods were employed and the combined results are as follows. The statistics refer only to persons belonging to categories A, B and C.

Year	Method	Number treated	Deaths	Per cent mortal
1921-24	Dried cords (Pasteur)	7,523	25	0.33
1924-25	Dilutions (Hogyes)	4,207	16	0.38
1925-27	Ether vaccine (Alvarez-Pereira da Silva)	1,164	*	0.17
1925-34	Killed phenol vaccine (Semple-Pereira da Silva)	8,461	4	0.05

* PEREIRA DA SILVA (E.) Le traitement antirabique à l'Institut Camara Pestana (1921-1934).—*Archives Inst. Inst. Camara Pestana*, 1938, Vol. 7, No. 2, pp. 225-234. With 3 graphs.

[It is to be noted that the numbers treated annually have fallen from a maximum of 3272 in 1925 to 254 in 1934 and that the numbers of dogs brains examined and proved to contain the virus has similarly declined from 230 in 1925 to 3 in 1934. It would consequently be unwise to assume that the reduction in mortality was due solely to the alterations in the method of treatment. The author expresses no opinion.]

VAZQUEZ-COLET²⁴ reports upon antirabic treatment at Manila during the period 1914-33. From 1914 to 1927 the vaccine consisted of 3-day cords emulsified in 0.5 per cent. phenolized saline. During the remaining years a 1 per cent. emulsion of fresh brain and cord in carbolized salt solution was employed. In each case treatment was given for 25 days.

During the period 1914-27 when 3-day cords were employed there were treated 6,268 cases bitten by dogs of which 5,716 were Filipinos, and 6 of them (Filipinos) developed hydrophobia. Only 3,450 of the Filipinos bitten by dogs took complete treatment and of the 6 that developed hydrophobia only 3 took complete treatment giving a death rate of 0.08 per cent. From 1928-33 carbolized vaccine was used. During this period there were treated 11,343 cases bitten by dogs of which 10,743 were Filipinos and 6 of them (Filipinos) developed rabies. Only 4,700 of the Filipinos bitten by dogs took complete treatment and of the 6 cases that developed only 2 received complete treatment giving a death rate of 0.04 per cent. The figures show that with the use of the dried cord the incidence of hydrophobia was twice as great as with the use of carbolized vaccine.

The author in his summary states that a comparison of the efficiency of the two types of vaccine employed brings out the fact that with the use of the 3-day cord the incidence of hydrophobia among the cases was twice as great as with the use of the carbolized vaccine. [As a matter of fact a difference in mortalities as great or greater than that observed would be likely to occur about once in two times on the assumption that the two vaccines were in fact equally efficacious. It is amazing that in the present state of knowledge the author should have laid any weight upon this observation.]

In Palestine²⁵ the treatment of rabies has been completely decentralized. There are now 31 provincial centres. During 1934 1,039 bitten persons have received a full course of antirabic treatment by Semple's method and amongst these 5 cases of rabies have occurred. The mortality rate is 0.48 per cent. as compared with 0.13 in the previous year. No neuroparalytic accidents have been observed.

v Rabies in Animals

The question of the control of rabies in wild animals with special reference to the conditions prevailing in South Africa was discussed at the Pan-African Health Conference at Johannesburg.²⁶ It was

²⁴ VAZQUEZ-COLET (Ana) The Pasteur Antirabic Treatment at the Bureau of Science Manila.—Philippines Jl Sci 1935 Aug Vol 57 No. 4 pp 435-442

²⁵ PALESTINE DEPARTMENT OF HEALTH ANNUAL REPORT FOR THE YEAR 1934 [Rabies pp. 40-52-56]

²⁶ QUARTERLY BULLETIN OF THE HEALTH ORGANISATION LEAGUE OF NATIONS Geneva. 1936 Mar Vol. 5 No. 1 pp 161-165—Animal Diseases communicable to Man. A. Rabies. [Report of Committee on Diseases conveyed by Animals to Man and Resolutions of Pan-African Health Conference, Johannesburg, Nov 20-30 1935 pp. 161-162] Dr Tott (P.J.) Wild Carnivora as Carriers of Rabies. [Annex pp. 162-165]

recommended that further research be undertaken in connection with the transmission and eradication of rabies, and that the biology of the small carnivora should be studied with a view to the elaboration of some method of destroying them. In an annex the rôle played in the spread of rabies in South Africa by animals belonging to the family *Primeridae* (meerkat) is discussed by Du Toit.

It is proposed to study the practical aspects of prophylactic vaccination of dogs in Indochina.²⁷ An installation has been set up for the purpose. The formulated vaccine of PLASTURUV will be used.

In a general paper SCHOOIJNG²⁸ discusses the place of prophylactic immunization of dogs in the control of canine rabies. If treatment were cent per cent effective and if every dog were treated, then prophylactic immunization of dogs would be successful as a sole means of controlling rabies. As this is not the case, prophylaxis must be supplemented by licensing, quarantine and the impounding and disposal of stray dogs.

vi. Miscellaneous.

LEVADITI and SCHOEX²⁹ find that street virus has an "elective affinity" for the neoplastic cells of Pearce's carcinoma. Tumours were grafted in the anterior chamber of the eye and in the testicle, and street virus was inoculated into the brain or under the cornea of the opposite side. Absolutely typical Negri bodies appeared in the neoplastic cells. Thus in the opinion of the authors, neurogenesis is not confined solely to neurones and corneal epithelium, but occurs also in epithelial new formations.

GREVAT³⁰ draws attention to the fact that in certain instances being animals may have an unusually high degree of infectivity and quotes a case in which 3 out of 4 persons bitten by the same dog succumbed to rabies. One received treatment but it was not commenced until 13 days after the bite.

He then describes an untreated case which terminated fatally. The patient was owner of the dog in question, and was in the habit of playing with it. He admitted that he had often been bitten while playing with the dog, and said that the only possible way he could have got any dog's saliva in contact with abrasions on his skin was possibly when he rubbed his cheeks and hands after shaving. There were no visible cuts or abrasions when he was examined, and he was not sent for treatment. The case was an unfortunate one, but the evidence is hardly strong enough to lead one to the conclusion that infection through the unbroken skin is possible. Grevat then discusses 4 cases of sequelæ after treatment by Semple's vaccine of which two showed paralytic symptoms—the first involved the bladder and rectum and the second was of the usual bulbar type. The symptoms in both cases were temporary and recovery was complete.

²⁷ Recueil des Mémoires de l'Institut Pasteur Exotique. 1933. July-Sept. Vol. 2 No. 3 pp. 118-123—Organisation d'un service d'étude de la vaccination antirabique des chiens en Indochine.

²⁸ Schooijng (H. W.) Can the Health Officer Safety Utilise Prophylactic Immunization as the Sole Means to control Canine Rabies?—Jour. of Public Health. 1938 Mar. Vol. 29. No. 3 pp. 263-277

²⁹ LEVADITI (Constantin) & SCHOEX (Rachid). Virus rabique et cellules nécrosées—C. R. Acad. Sci. 1938 Feb. 24 Vol. 200 No. 8 pp. 703-704. With 3 figs.

³⁰ GREVAT (S. D. S.). Against Orthodoxy in Rabies—Jour. Med. Gen. 1938 Feb. Vol. 71 No. 2 pp. 69-74 [15 refs.]

The pathogenicity of the Chinese Hamster to fixed virus rabies is the subject of a communication by YEN³¹. The incubation period varied between 5 and 8 days and the symptomatic picture was similar to that observed in the rabbit. Negri bodies measuring 4 to 6 μ were found in the usual situations. The virus has been carried to the 10th passage in this animal.

An outbreak of rabies is reported by GODDING³² from British Somaliland. Four persons in the Borama district have died of the disease and various species of animals including an Aardwolf (*Proteles cristatus*) have been involved. It is stated that rabies is endemic in Abyssinia and that the incidence of the disease in Harar and Jigjiga is at the moment above normal. Every precaution has been taken to prevent further spread of the disease but Abyssinia remains a potent source of infection. This is the first time that rabies has been reported from the Somaliland Protectorate.

A G McKendrick

³¹ YEN (Albert C. H.) Experimental Virus Infections in Chinese Hamster I Susceptibility to Fixed Rabies Virus—Proc Soc Experim Biol & Med 1938, Apr Vol. 34 No. 3 pp 315-318

³² SOMALILAND PROTECTORATE ANNUAL MEDICAL & SANITARY REPORT FOR THE YEAR ENDING 31ST DECEMBER, 1934 Appendix II pp 93-98—Report on an Outbreak of Rabies at Borama, June-October 1934 [Goddings (H. C.)]

MALARIA.

SINTON (J. A.) What Malaria costs India, Nationally Socially and Economically—*Records of the Malaria Survey of India*. 1925. Sept. & Dec. Vol. 5. Nos. 3 & 4 pp. 223-284 413-469 1926. Mar. Vol. 6. No. 1 pp. 91-169 With 1 chart. [10 pages of refs.]

Colonel Sinton has collected in this series of papers a great deal which has been written about the evil effects of malaria in India and other parts of the world. He has attempted to assess in terms of money the value of the work the malaria-stricken people leave undone, the loss on the work they do badly, the cost of the medicine they drink, the cost of their funeral expenses and so on, and has added the results together to make an enormous total. Alcohol, rats and other evils have been treated statistically in a similar manner but we are indebted to Colonel Sinton for telling us what is often forgotten in many a malaria-survey which records the spleen measurements to several places of decimals—that is, the effect of the disease upon the health and happiness of the people.

Colonel Sinton makes out his bill of charges under four heads (1) The effect of malaria upon the natural increase of the population. (2) Its effect upon the health and vitality of the people. (3) Its effect upon the social, intellectual and political progress of the nation. (4) Its effect upon the economic, agricultural and industrial development of the country. He then attempts to estimate the financial loss which the disease causes to India and whether it would pay to undertake measures to control it. He finds that malaria lowers the birth-rate by reducing the number of conceptions and by causing abortions and still-births. He quotes evidence that impotence is common in waterlogged villages and in the malarious parts of the Terai. In a record of the year 1870 concerning villages along the Western Jumna Canal, it was stated "The unfruitfulness of women is a subject of common remark, and the consequent difficulty of inducing other Jain families to give their daughters to the men of Panipat and the environs of the canals generally is very great." As regards abortions, it has been estimated that, in Bengal alone the potential population is lowered annually by 800,000 persons from this cause, and that 37·8 per cent. of these abortions are due to malaria.

Malaria raises the death rate not only directly but also indirectly by lowering the general vitality of a community it prepares the ground for other diseases, and is responsible for many a death of which it is not actually the immediate cause. The author considers that "it seems probable that malaria, by its direct and indirect actions, is responsible for at least 2,000,000 deaths each year in India."

One must admit that Colonel Sinton has demonstrated that the population of India would be very much larger than it is, if it were not for the annual sacrifice which is paid to malaria—but will this argument stir the administrator to enthusiastic action? On page 465, one reads

During the 60 years which have elapsed since the first Indian census was taken in 1872, the population of this country has increased by 46·6 per cent. As a result, a problem of the greatest national importance has arisen as to how these increasing millions are to gain a decent livelihood in the future." The author's answer to this question

is that the disease cannot be considered as a healthy pruning—it attacks both fit and unfit indiscriminately and those it does not kill it often leaves maimed and crippled to swell the ranks of the unfit.

In connexion with the evil influence of malaria on the physical development of children and adults we find a very pleasing quotation evidently from America. Every once in a while somebody rises up to criticise modern parents for devoting too much time to their children's physical being (as compared with their spiritual and educational). Our righteous ancestors disregarded their bodies and paid attention to their souls, and it might be added that by neglecting their bodies in the interests of their souls they beat us to heaven by an average of twenty years.

The author computes the number of persons suffering annually from malaria in India, at the high figure of one hundred million—in addition to this there are those suffering from an indirect morbidity predisposed to by this disease which may be between 25 and 75 million cases. Apart from the economic loss caused by the action of malaria upon the mental state of the population this disease has the deplorable effect of hindering greatly the intellectual social and national development of many people afflicted by it. The cost of medical attendance in respect of malaria in India is assessed at £15 million per annum the loss in wages at £18 million the loss from post-malarial inefficiency at £22 to £55 million unprofitable funeral expenses £500 000 economic loss from deaths directly due to malaria £67½ million sterling. Beyond all this there are the financial losses of the community in respect of the value of houses and land, and a hundred other things to be taken into consideration. Agriculture loses incalculable sums because of the action of malaria in causing loss of work, and the abandonment imperfect cultivation or retarded development of large fertile tracts. Why is malaria productive of so much suffering in rural India when it causes comparatively little illness in Africa among natives living in hyperendemic areas as Garnham of Kenya and Wilson of Tanganyika have told us? The loss caused by malaria to the development of mining industries and the effects of malaria on the railways are next taken into consideration. So the bill grows and one cannot help wondering what would happen if it could be liquidated—if malaria could be conjured away. Would India be transformed into a Garden of Eden, or would there be a hitch somewhere the kind of horrid snag which comes into stories like *The Monkey's Paw*?

William Fletcher

SINTON (J. A.) Malaria Prevalence in its Relationship to the Problems of Food Supply and Increasing Population in India.—*Records of the Malaria Survey of India*. 1938. Mar. Vol. 6 No 1 pp 53-65 [34 refs.]

The increase of population has outstripped food production. Fertile tracts remain uncultivated because of malaria. Poor living and malaria have made the peasants so dull and lethargic that they are without initiative. It would pay India to commence a more intensive anti-malaria campaign.

The population of India is now about 353 000 000. It has nearly doubled within the last 60 years. It has been said by the Government Agricultural Chemist Mr Viswa Nath that India's food production is

sufficient for only two-thirds of her population. This means an exceptionally low standard of living. The solution of this problem depends largely upon (1) An increased production of food stuffs; & An increase in industrialism and the development of the natural resources of the country.

Compared with agriculture the other industries of India are of minor importance no single factor is so important as the increase of the locally grown food supply. Much of the most fertile land is also the most malarious and malaria is the chief disease which hinders the expansion of agriculture. Italy in reclaiming the Campagna has recently given an example of the way in which this problem can be solved. In India, many large fertile tracts have remained uncultivated because of malaria. Care must be taken that no hasty attempts to colonize are undertaken before the areas have been rendered fit for occupation by means of antimalaria work. In the scheme for the colonization of Palestine after the war swampy fertile tracts were acquired by the promoters and they were occupied without preparation. The results were disastrous, but, by the introduction of proper malaria-control measures disaster was eventually transformed into success. The colonizing agencies now realize that it is a bad practice to settle people in malarious areas until provision has been made to render these areas habitable. There seems little hope of any satisfactory advance in the extension and improvement of agriculture in India so long as the rural populations continue to bear this enormous burden of malarial sickness, that is sapping both their physical and social activities.

VIERWENHUIS (A. W.) Körperliche und kulturelle Verlorenstung in Gebieten endemischer Malaria. Mittel-Sumatra. (Physical and Cultural Race Degeneration in Endemic Malaria Region Central Sumatra.)—*Jeruz. 1934* Vol. 39 pp. 171-178 183-211 and *1935* Vol. 39 pp. 37-45 94-104 17-134 212-218. With 1 folding map.

The author considers that central Sumatra offers very good factors for studying the problems stated in the title. Because exactly malaria is the most important of the deleterious influences there and it is rampant in the eastern plains but the western Barisan high mountains are free from endemic malaria. As a result the Malaya population of the eastern half is very small, whereas the mountains of the west are very populous also in culture the same difference is noted, high in the west low in the east.

He quotes the observations of Doorenbos on the vectors of malaria in Sumatra 243 137 mosquitoes were caught and classified on the east coast of Sumatra the result of 80 687 dissections is described. The highest infection rates for the different species of anophiles are —

			Percent
<i>A. stimulans</i>	Londut, December 1930	5 out of 41	12.2
<i>C. Kochi</i>	Ayer Poeth, 1 October 1928	9 " 59	15.3
<i>M. acomata</i>	Colt Estate, April 1928	3 " 35	11.5
<i>A. leucospilus</i>	H. Poest, October 1925	4 " 101	4.0
<i>A. maculatus</i>	Londut November 1928	9 " 63	17.0

He deals also with the anthropological studies in Sumatra by Drs. Klefweg de Zwaan and Alfred Mass.

This monograph is a mine of information and deals with most important scientific and practical problems. It should be consulted in the original by those interested.

E D W Greig

RIVISTA DI MALARIOLOGIA. SEZ I 1935 Vol. 14 No 6 Supplement 114 pp —Conferenze sulla malaria tenute nell'agosto del 1935 [Conference on Malaria, Rome, August 1935.]

Malaria therapy and research. Immunity due to latent infection. Importance of repeated inoculation in the production of immunity. Prophylaxis by drugs. Dangers of plasmoquine. Disappearance of malaria due to change in race of anopheles. Housing and malaria. Testing drugs on bird malarias. Kikuchi's belief in direct action of quinine. Integral bonification and *bonifica umana preepidemica*.

The first paper in this series is written by M CIUCA. It concerns the service which therapeutic malaria has rendered to the proper understanding of the disease. Investigations are being carried out in Rumania at the malaria therapy station established with the help of the Rockefeller Foundation in connexion with the mental hospital at Socola.

The second paper deals with immunity in malaria and is by the same author. As illustrations of the development of immunity in a population he instances the immunity of adult Indians in certain parts of the United Provinces and elsewhere which has been acquired at the cost of the sacrifice of an enormous number of children in infancy. [Communal immunity in Africa is attained without so great a sacrifice see WILSON below p 765] The author has found that a latent infection is present in 60 per cent of benign tertian immunes and in 100 per cent of subtertian and quartan immunes. These figures were obtained as the result of tests made by inoculating patients' blood into non immunes but it does not always follow that an individual is entirely free from parasites because no infection results from the inoculation of his blood. A latent infection following a first injection does not necessarily confer immunity. The important factor in immunity is repeated inoculation.

The third paper which concerns the relative value of different drugs is also by M CIUCA. As a result of his studies at Socola, he agrees with the malaria commission of the League of Nations that the method of choice in clinical prophylaxis is the administration of a daily dose of 5 grains of quinine during residence in a malarious district and for several months after leaving it. A daily dose of 0.1 gram of atebrin could be employed in the same way but it has the disadvantage of staining the skin yellow. The author treated a number of patients, some suffering from naturally contracted and some from therapeutic malaria, with the following doses (a) Atebrin 0.3 gram (b) Quinine 1 gram (c) Atebrin 0.3 + quinine 0.5 gram (d) Atebrin 0.3 + plasmoquine 0.02 gram. The duration of the treatment was 7 days in each case. In the treatment of benign tertian and quartan, quinine and atebrin were equally efficacious but there were fewer relapses after atebrin. In the treatment of subtertian atebrin appeared to be somewhat better than quinine and it should be employed in all severe attacks which are resistant to that alkaloid. Atebrin and quinine given together did not act better than either drug given alone. In quartan malaria there were fewer relapses after atebrin + plasmoquine than after other drugs but this was not the case in benign tertian (but

see SIEVOR ante p. 688) In any case according to the author, the mixture atebriin + plasmoquine is so apt to be toxic that it should never be employed.

The fourth and fifth papers are by L. W. HACKETT concerning the Races of *Anopheles maculipennis* the Natural Disappearance of Malaria and the Methods of Attacking Malaria. Discussing biological methods of control he writes that animal barriers can be of use only when the anophelis are concerned which feed by instinct on animals such, for example are *marteria melanoon*, *ttypicus* and *strobarmus* whilst *lebranchius* are never deviated by cattle. On the east coast of England where cases of malaria occurred during the war JAMES noticed that anophelis stayed in houses and continued to feed during the winter. This he ascribed to the darkness and poor ventilation of the houses which encouraged the mosquitoes to remain there. Now it is known that this phenomenon was due not to the faulty character of the houses, but to the presence of the *strobarmus* race of *A. maculipennis* which does not go into hibernation but abhors in dwellings and continues to feed through the winter. In central England, another race is present which winters in uninhabited buildings, ceases to feed and goes into complete hibernation. Disappearance of malaria is sometimes due to a change in the anopheline fauna. For example in the Po delta *strobarmus* was formerly present but irrigation and agriculture have modified conditions in favour of *strobarmus* which is not a carrier in this district, and *strobarmus* has ousted *strobatus* to the great benefit of the district. In the polders of the Low Countries *strobarmus* breeds in the brackish lagoons, but when the lagoons are cut off from the sea and fresh water is continually running into them, they gradually become fresh water bogs and *strobarmus* is supplanted by *marteria*. At Durazzo, the port of Albania, there was a large brackish lagoon which could not be treated in this way because no large rivers ran into it. The author dealt with this by fixing automatic sluice-gates which admitted the sea water but did not let it out again and, in the course of two years, the salt content of the lake had increased through evaporation, to such an extent that *strobatus* could breed in it no longer. Again the author has observed during the last two years, the gradual replacement of *strobatus* and *lebranchius* by *marteria* and *melenoon* in the Pontine Marshes. *Maculipennis* does not appear to be the only anopheline which consists of several races. There are others, for example, *fuscipes*, *maculatus* and *pseudopunctipennis* which behave as dangerous carriers in some countries, but are quite harmless in others, and it may be that these species, too, contain different races.

W. KIKUTI contributed a paper on Experimental Immunology and the testing of drugs on the malarias of birds and monkeys. He found that plasmoquine administered to Java sparrows infected with *Haemoproteus* caused the disappearance of gametocytes from the blood. They soon returned, because the plasmoquine had no effect on the schizonts in the tissues, but, when the schizonticide, atebriin, was given in addition, the schizonts were destroyed and there were no more relapses. The author does not believe that either quinine or the synthetic drugs act indirectly - he states that more and more evidence is being accumulated in favour of the direct action of these drugs on the parasites.

Dr LUTRAZZO described the Hygiene Organisation of the League of Nations which includes the Malaria Commission, of which he is President, the Cancer Commission and other bodies.

Professor OTTOLENGHI dealt with the question of prophylaxis by means of drugs and gave instances of excellent results which had been obtained by giving courses of mass treatment at the end of the spring before the beginning of the malaria season. Very good results were obtained at Ferrare with a ten-day course of plasmoquine and quinine. (First 2 days plasmoquine 0.03 + quinine sulphate 0.9 Third day plasmoquine 0.02 + quinine 0.6 Fourth to tenth day plasmoquine 0.01 + quinine 0.3 gram) Atebrin + plasmoquine has also been used with success in this *bonifica umana preepidemica*

Professor OTTOLENGHI also discussed the question of *grande bonification* and emphasized the importance of regulating the supply and flow of water. The disappearance of *clitellus* from the region of Ferrare he ascribes to a change in the chemical composition of the water which has been rendered less saline owing to abundant irrigation with river water. Malaria control is only a part of bonification. When the work of reclamation is first begun, it is necessary to push on with the main drainage schemes as quickly as possible and during this period it is necessary to prosecute vigorous antimalaria operations but as the land is developed and settled with men and beasts less and less antimalaria work is necessary

W F

PICORI (G) & ESCALAR (G) Relazione della campagna antimalarica nell'Agro Romano durante l'anno 1934 [Report of the Anti-malaria Campaign in Agro Romano during 1934]—Riv. di Malariaologia. Sez. I 1935 Vol. 14 No. 6 pp 469-519 With 2 graphs & 1 map

The main points only of this detailed report can be referred to here. By the beginning of the year there were 34 sanitary stations each with its medical officer and staff and the whole under the central Directorate of the Government Bureau of Hygiene. In the Agro were 101 schools with 8,000 pupils. As in preceding years the campaign included quinization mechanical protection destruction of larvae and adult mosquitoes and zooprophylaxis and these were applied according to the gravity of the endemicity the prevalence of anopholes and so forth. Antilarval measures were carried out in 20 zones quinine prophylaxis in 15 and the malaria attack rate was only 0.7 per cent. Blood examinations totalled 70,000 Incidence including primary cases and relapses was 1.99 per cent. (1.98 in 1933) primary cases were 0.9 per cent. of the population (0.6 in 1933) this increase applied to benign tertian infections only malignant tertian definitely was less so that the author states the incidence of infection continued, as in the two preceding years, to fall. Zooprophylaxis at Ardea, has resulted in a further diminution of malaria among the inhabitants of this village from 7.5 per cent. in 1933 to 5.3 prior to the institution of this measure the incidence was 32.2 per cent.

H H S

SERGENT (Edm.) SERGENT (Et.) PARROT (L.) & CATANEI (A.) Etude épidémiologique du paludisme. Technique des indices endémiques [The Technique of Endemic Indices.]—Arch Inst Pasteur d'Algérie 1935 Dec. Vol. 13 No. 4 pp 568-576. With 7 figs. (1 map) & 3 plates.

This is an instructional pamphlet.

It is necessary before undertaking a malaria campaign, to estimate the amount of malaria present in the locality. This is done by determining the following indexes. (1) *The Splenic Index*: this is the percentage of children under 15 with enlarged spleens palpable below the costal margin. (2) *The Splenometric Index*: the projection of each spleen below the costal margin is measured in finger breadths. Spleens up to one finger-breadth are measured as 1, spleens up to 2 finger-breadths as 2, and so on—all spleens above 5 finger-breadths are measured as 6. The average size of the enlarged spleens is given by adding together all the finger-breadths and dividing by the number of enlarged spleens examined. The splenometric index is obtained by multiplying this figure by the splenic index. That is to say the splenometric index—the percentage of enlarged spleens \times the average size of the enlarged spleens measured in finger-breadths. For example if there were 40 per cent. of enlarged spleens and the average size was 2 finger-breadths, then, the splenometric index would be 40×2 . It indicates not only the prevalence of enlarged spleens, but also the degree of enlargement. It is particularly useful in assessing the value of anti-malaria measures in places where the splenic index is high and the spleens are very large. Here the splenic index alone would not detect an improvement indicated only by a general decrease in size of the enlarged spleens if they remained palpable. (3) *The Parasite Index*: this is the percentage of children under 15 in whose blood parasites are found during a single examination of a thick drop preparation for a fixed period of 5 to 10 minutes. (4) *The Endemic Index of Ross*: this is obtained as follows: the number of children with parasites in their blood + the number of children with enlarged spleens but no parasites, is divided by the total number of children examined. This index is a useful complement to the splenic and parasite indexes and is particularly useful in the comparison of different localities. (5) *The Sporozoic Index*: this is the percentage of anophèles with sporozoites in their salivary glands. The following technique is recommended: remove the legs and wings of the mosquito; fix the thorax by transfusion and a pin; seize the head with fine forceps and pull it off—two strong drops are visible at the back of the head, these are the salivary glands; spread them out on a slide. Sometimes the glands remain in the thorax. In this case squeeze the thorax, and make a film with the fluid which exudes at the place where the head was cut off. It is advisable to do this in any case even when the glands come away with the head.

W. F.

QUINTAXA OTERO (Fernando). El problema del paludismo en la cuenca del Esla (Zamora) [The Malaria Problem in the Duero Valley (Zamora)]. *Medicina Pública Colidio*. Madrid, 1931. Apr Vol 9 No. 4 pp. 160-187 With 5 figs. & 1 map.

As a result of investigations carried out in the Zamora Province the author concludes that among the riparian settlements of the Esla disease conditions for malaria are present, larvae of *A. maculipennis* have been seen in the pools and deposits about the houses, and adult forms in the stables and pigsties near human dwellings in some of the settlements cases of indigenous malaria are met with, that among the people are infected persons coming from other parts when the malaria endemicity is great that this conjunction of circumstances aggravates the local liability to infection.

In the Aliste valley however malaria is not endemic and the splenic index is nil. There are excellent breeding sites for mosquitoes in Vegalatrabe Vide and Losacino—small collections of water clear undisturbed and covered abundantly with vegetation—but they hardly persist during the spring and in the summer disappear altogether if there are heavy rains they collect again in September. Hence usually one perhaps two generations only of mosquitoes are produced in the spring and again in the autumn. This interruption of the biological cycle during summer is held to account for the absence of endemicity. The following are, in sum the author's conclusions —

1 Anophelism at the present time among those living in the Esla valley is small and limited to part of the warm season

2 In the pasture lands the mosquitoes breed abundantly and continue to do so in the summer

3 Among the inhabitants malaria is practically entirely sporadic.

4 The dam is a source of danger only in so far as it increases the number of breeding sites or prevents those already existing from drying up.

5 The remedies are (1) to drain the borders so that collections are not left when the dam is emptied (2) to treat cases

H H S

CARR (Henry P.) MANDEKOS (A.) & BARBER (M. A.) Malaria Studies in Greece. A Survey of Malaria Morbidity in a Region of East Macedonia.—*Ann Trop Med & Parasit* 1935 Dec. 18 Vol 29 No 4 pp 399-405

There is a high degree of tolerance of infection in this district though many were infected few were incapacitated.

The purpose of this survey was to obtain information as to the amount of actual illness due to malaria in East Macedonia. Nineteen villages representing various degrees of malarial endemicity were visited during the malaria season between August and October. The presence of parasites or an enlarged spleen did not necessarily indicate illness in some of the villages 60 per cent of the children who were quite fit to attend school had parasites in their blood and 80 per cent had enlarged spleens. With regard to the amount of recognizable clinical malaria in the whole survey the totals indicate less than 2 per cent clinically ill including parasite positives and negatives. Among parasite positives the percentage is under 1. These percentages represent the findings at one visit. Repeated visits would doubtless have detected a much larger number of sick. In a group of villages with a population of 2089 where malaria was highly endemic only 3.5 per cent. were found wholly or partly incapacitated at the time the survey was made and not all of these cases were suffering from malaria. There was less illness in villages where endemicity was low than in those where it was high

H F

TIMBRES (Harry G.) Studies on Malaria in Villages in Western Bengal.—*Records of the Malaria Survey of India* 1935 Dec. Vol 5 No 4 pp 345-370 With 5 graphs & 1 map

A philippinensis is the chief vector Benign tertian and quartan infections are common.

This malaria survey was made in 7 villages situated in the District of Birbhum Bengal. It was continued for 89 weeks from July 1932 to April 1934. It was made possible through the help of the Institute of

Rural Reconstruction, which is the Village Work Department of the Visva Bharati founded by Dr Rabindranath Tagore and the American Friends Service Committee of Philadelphia who lent the services of the author. The population of the villages numbered 2,582. It is on the whole a hyperendemic area. The distribution of types of malaria in the autumn and spring epidemics was as follows: August to December, *tertix* 58.2 per cent., *fusciparum* 33.2, *malariae* 8.8; January to March, *tertix* 47 per cent., *malariae* 31.2, *fusciparum* 21.8.

A. culicifacies A. *mimicus* and A. *acrosites*, carriers in other parts of India, were relatively scarce and never found infected. The chief carrier in the summer and autumn was A. *philippinensis*; the only other carriers of importance were A. *stroblians* and A. *fulvipes*. A. *pallidus* was the only species found infected during the cold-weather months preceding the spring epidemic. A. *stroblians* was very scarce at this time. A. *philippinensis* was very scarce. All three species bred in still, clean, shady water with aquatic vegetation. Rice fields were not important breeding places.

An experiment with plasmoquine and quinine was carried on for six months in the four central villages of the group. The object was to see if partial plasmoquinization of those persons most likely to harbour gametocytes would have any noticeable effect in reducing the incidence of malaria. During the time the drugs were being given there was less malaria, and the sporozoite rate was lower in this group of villages than in the three peripheral villages forming the control group but the author is of opinion that the results of the experiment were inconclusive.

W F

Sixtox (J. A.) "Man-Made" Malaria in India.—*Indian Med. Gaz.* 1930, Apr. Vol. 71 No. 4 pp. 181-187 [37 refs.]

Emphasizes the harm done by large irrigation schemes planned without due regard to drainage.

The effects of human activities in increasing the prevalence of malaria are considered under the following heads—

A Conditions leading to economic stress and lowered resistance. Example severe economic stress which follows the water-logging sometimes caused by large engineering works.

B Introduction of human carriers into a healthy area or of mosquitoes into a malarious area. Example aggregations of tropical labour in connexion with large industrial, engineering, mining or other projects. The infection is liable to spread from the labourers to the surrounding inhabitants. C Measures resulting in an increase of anophiles. (a) Local Activities. Examples Ornamental fountains and fountains in Delhi. Cisterns and wells in many towns. Borrow-pit bed drainage, badly controlled water supply, dripping taps. (b) Wide-spread activities causing increase of water. Examples Local excavations in connexion with engineering works. Obstruction to natural drainage by the construction of roads and railways. Introduction of large irrigation projects without the provision of proper drainage. Improper use of irrigation water. Leaking irrigation channels. The water-logging Board of the Punjab have issued a statement of the "principles to be observed in the preparation of canal projects but, unfortunately these principles appear to have been ignored, and enormous losses have resulted—decreased prosperity of the population, decreased fertility of the land and decreased health

of the people have been caused by the neglect of proper precautions
 (c) Widespread activities causing decrease of water The great example of this is in lower Bengal where large areas which in the past were covered by silt bearing water from the Ganges at certain seasons of the year have now been deprived of this irrigation. This inundation irrigation was stopped by the building of embankments roads and railways with the result that anopheles breed in the pools and dead ends of the old drainage-canals and for lack of river silt the land is impoverished. The people are sunk in poverty and a vast proportion of them suffers each year from recurring attacks of malaria. The author discusses the remedies for these malaria producing conditions and emphasizes the importance of co-operation between different government departments.

W F

MORIN (Henry G S) A propos de certains échecs de la prophylaxie antilarvaire du paludisme [Certain Failures of Antilarval Methods of Prevention in Malaria].—*Bull Soc Méd-Chirurg Indochine* 1936. Mar Vol 14 No 3 pp 327-329 With 4 figs

An illustrated warning that failure to achieve adequate results by drainage as an antimalaria measure is sometimes attributable to faulty construction and even more to negligence in upkeep

Norman White

HEALTH BRKRS 1935 Nov 16 Vol 12 No 11 pp 3-4—Malaria Control.

EJERCITO (Antonio) Present Orientation in the Control of Malaria in Tropical Countries.—*Jl Philippine Islands Med Assoc* 1936 Feb Vol 16 No 2 pp 61-71 With 5 figs on 2 plates

SCHWIEBERT Ueber einen neuen Fall von endemischer Malaria tertiana. [Another Case of Endemic Malaria (in Germany).]—*Deut Med Woch* 1936 May 29 Vol 62 No 22 p 898

From March to August 1935 the patient was working in Emden but enjoyed good health all the time. He then moved to Weilburg an der Lahn and a month later fell sick with a shivering attack the next day there was no fever but repeatedly thereafter every other day he had fever and the blood picture and the symptoms were those of the classical tertian malaria. The symptoms cleared up when quinine was given but relapse occurred soon after he left hospital. The author discusses the question of place of infection and concludes that it must have been Emden which is one of the few remaining endemic foci in Germany to-day

H H S

DEFRUJOLS (B P) Le paludisme autochtone dans la 18e région [Indigenous Malaria in Bordeaux].—*Rev Service Santé Milit* formerly *Arch Méd et Pharm Milit* 1936 Mar Vol 104 No 3 pp 419-445 With 3 figs. [12 refs]

The city of Bordeaux is situated amid great marshes on the banks of the Garonne during the Middle Ages there were repeated epidemics whenever any work was undertaken to drain these marshes and enlarge the town. In 1895 there was an outbreak when the docks were being (112)

C

extended. In 1921 six cases were observed in children who had never left the town. 6 cases occurred at the same time among soldiers, 3 of whom were living in the camp of Songe 20 kilometres from Bordeau. In 1934 there was a small epidemic in this same camp during the second half of August. It has been suggested that an indigenous strain is responsible but the author thinks that the small outbreaks are probably due to infections introduced by African troops and by soldiers returning from the colonies.

W F

SUMMERS (G.) De malaria te Oosthaven.—*Geschied. Tijdschr. v. Med. Indië* 1930 Mar 10 Vol 78 No. 10 pp. 613-623. With maps & 6 figs. on 2 plates.

FAONI (Sero) La malaria nelle colonie italiane dell'Africa Orientale.—*Arch. Ital. Sci. Med. Colon. e Parasit.* 1930. Feb. Vol 17 No. 1 pp. 105-114. With 2 figs.

BARBER (M. A.) & RICE (J. B.) Malaria Studies in Greece. The Relation of Housing to Malaria in Certain Villages of East Macedonia.—*Amer Jl. Hyg.* 1935. Nov Vol 22 No. 3 pp. 512-538. With 4 figs.

It made no difference in this region, whether the house was old and dark or new and light. Only one thing mattered, and that was screening.

These observations were made in certain plains of Eastern Macedonia where *A. claviger* is the chief and probably the only important vector of malaria. *A. superpictus* is very uncommon and *A. maculipennis*, though abundant is very rarely infected. The habits of spontaneously infected *culex* are the same as those of the uninfected. Infected *culex* are found in stables nearly as often as in houses. Two different types of houses, the old and the new intermingled in the same village, were compared. The observations were continued for two years. With regard to density of anopheline sporozoite rate, and human positive percentage of blood meals, *culex* in old and in new houses showed no significant difference. *Mansoniensis* was more common in the old dark houses, but was very rarely infected. The proportion of infants infected was practically the same in both types of house. The results on the whole do not offer much encouragement to the hope that improvement in housing other than by screening, would be an effective anti-malaria measure. One could not even say that the house is the locus of infection, unless one includes in it the larger numbers of people sleeping outside.

W F

IRAQ GOVERNMENT OF Ministry of Interior Public Health Directorate. A Compilation of Vital Statistics of Iraq 1935. [Malaria] pp. 19-24 With 1 folding map & 1 folding chart [32-33.]

The Public Health Adviser Dr T H HEGGS reports that malaria is the most important disease in Iraq. The spleen rate in the town of Baghdad is nil but in the outlying country it is 30 per cent. In Basrah it is 17 per cent. in the spring and 40 per cent in the autumn. Subtertian is the commonest form in lower Iraq and benign tertian in middle Iraq. quartan is limited to the hills of Kurdistan. The malaria season lasts from May to November with a remission in September.

Owing to river floods malaria was epidemic in 1928, 1929 and 1931. An average of 83 grains of quinine was issued to each of the 277,823 persons treated during 1934.

W F

KATTAN (H) Malaria in Palestine 1911-1935 — *Jl Egyptian Med Assoc* 1935 Dec Vol. 18. No 12. pp 802-813 With 3 charts

The following figures represent the percentage of malaria cases among the patients attending —

(1) Three years 1911-14	32 per cent.
(2) Three years 1914-17	47
(3) Five years 1919-23	19
(4) Five years 1923-28	9

W F

SCHILLING (Claus) Die Malariaepidemie auf Ceylon 1934/1935 nach den Berichten von Briercliffe und Gill — *Arch f Schiffs u Trop Hyg* 1938 Feb Vol. 40 No 2. pp 61-63 With 1 fig

MAURITIUS COLONY OF ANNUAL REPORT ON THE MEDICAL AND HEALTH DEPARTMENT 1ST JANUARY TO 31ST DECEMBER 1934 [KIRK (J Balfour) Director] Appendix III pp 53-56 — Annual Report of the Malaria Branch for the Year 1934 [McGREGOR (Lewis J) M O l/c Hookworm & Malaria Branch]

A drought which occurred early in the year 1934 was responsible for a reduction in the number of cases of malaria. The disease has shown a tendency to extend up into the healthy highlands and the policy adopted during 1934 was to concentrate all efforts in the Planes Wilberns district which is situated in the centre of the island above the 600-foot contour. Work in the coastal lowlands was limited to the maintenance of existing drains keeping them free from vegetation and the like. The spleen rate for the upland area investigated was 10.5 but in spite of this very few anopheline breeding places were found. The Malaria Officer is of opinion that the malaria in this area is the residuum of the outbreak which occurred as the result of the cyclone in 1931. All three types of malaria were found in almost equal proportion benign tertian being rather more common and quartan rather less common than subtertian. *A. costalis* is much the most common mosquito but *A. funestus* and *A. maculipennis* are also found.

W F

BECHUANALAND PROTECTORATE ANNUAL MEDICAL AND SANITARY REPORT FOR THE YEAR 1934 [DYKE (H W) P.M.O] [Malaria pp 12-17]

Regular prophylactic quinine is recommended. Malaria occurs in cycles. An epidemic, following several healthy years and associated with famine, occurred in the Kalahari.

Notwithstanding the disfavour with which quinine prophylaxis is regarded by many authorities it is strongly advocated in this territory as being the only prophylactic available to the majority of the population. Some of the worst cases of malaria one has seen among Europeans recently have occurred in those who refused to take quinine because they had been

told, or read that quinine in many malarious countries was now entirely discarded on the advice of eminent malarialogists! Whereas the experience in Ngamiland where malaria is endemic is that officials and others who take quinine regularly throughout the summer months are seldom incapacitated for their work even though when on journeys they were exposed to certain and unavoidable infection.

The incidence of malaria was very low from 1930 to 1931. During the latter year it remained low in the eastern part of the Protectorate but in the western (Kabahari) part a very serious epidemic occurred. The resistance of the population "was lowered owing to lack of food, locusts having destroyed their cultivated crops and because of foot-and-mouth disease they had been unable to export their cattle which is their normal source of income. The epidemic was preceded by heavy and continued rain. The case mortality was about 4 per cent among Europeans and Eurafricans, and 10 per cent among natives. There were many cerebral cases. As the affected district lies some 200 miles from a railway-station medical relief was carried by aeroplane.

H. F.

CALONNE (R.) La malaria dans le Haut Ituri. Le danger des barrages. (*Malaria in the High Ituri*).—*Arch. Soc. Belge d' Med. Trop.* 1935 Dec. 31 Vol. 15. No. 4 pp. 301-329
With 1 map

An instance of man made malaria at an elevation 5,000 feet, resulting from the damming of streams for agricultural purposes.

The High Ituri is on the west side of Lake Albert, facing Uganda on the opposite shore. It is a mountainous plateau lying at an altitude of some 5,000 or 6,000 feet and situated almost on the equator. The warm season begins in May and ends in October. When the rains cease in September and October fires are necessary even during the dry. From January to April, when it is very dry the days are warm but tempered by cool winds, and the nights are so cold that freezing point may be reached. The soil is very fertile and there are numerous plantations, especially coffee plantations. The author's examination of native tribes has convinced him that this region is normally almost free from malaria. The coffee-factories need water for the fermentation and decortication of the berries, and for this purpose dams have been erected across some of the ravines which have been converted into lakes covered with vegetation and sheltered from the wind. The splenic index of the labourers living in the neighbourhood of these reservoirs is between 80 and 90 per cent. as compared with 1 or 2 per cent. in villages more than 3 kilometres distant from them. The ravines are harmless in their natural state but they are dangerous when they are disturbed. For example, several were cleared and imperfectly drained for agricultural purposes by a religious mission, with the result that malaria broke out among the children in their school. The anophèles have been found on the high plateau of Ituri, *A. gambiae* and *A. christyi*. Most of the cases examined by the author were infected with *P. falciparum* but *P. vivax* and *P. malariae* were also seen.

[NEWSREAD and CARTER first described *A. christyi* under the name *Neocellia ? christyi* n. sp. from a single specimen (?) taken in Uganda by Dr C. CHRISTY. They wrote that it was a very striking species but that they could not from the single specimen, be quite certain whether it was correctly placed in the genus *Neocellia*. (NEWSREAD

and CARTER. *Ann Trop Med & Parasit* 1911 Vol. 5 pp 238-240)

EVANS in her book on Anophelines of Tropical and South Africa (1927) described *Anopheles christyi* at p. 41 placing it in the group *Neomyzomyia* Christophers (1924) and giving its distribution as Uganda and Kenya Colony. Under Habits she noted that adults were found commonly indoors in Nairobi. SYMES writing in 1930 on *A. christyi* in Kenya (*Kenya & E. African Med Jl* 1930 Vol. 7 pp 2-11) said that it appeared to be definitely attracted to cattle and that it occurred in dwellings occasionally but in very small numbers. [This discrepancy may have seasonal explanation?] LEESON reported it from S Rhodesia but stated (*S African Jl Sci* 1927 Vol. 24 pp 424-428) that its larvae were not taken in sufficient numbers for data to be recorded. SEYDEL (*Rev Zool Bot Afr* 1929 Vol. 28 pp 28-31) has reported it from the Kivu district and the volcanic region of the Virunga in the Belgian Congo.

It does not seem to have been definitely associated so far with malaria in Kenya S. Rhodesia or Uganda.] II F

WILSON (D Bagster) Rural Hyper-Endemic Malaria in Tanganyika Territory.—*Trans Roy Soc Trop Med & Hyg* 1936, Apr 8. Vol 29 No 6 pp 583-618. With 10 figs. [25 refs.]

Malaria causes comparatively little illness in Africans living in a hyperendemic area.

This valuable study was made in two out-of-the-way villages with a Bantu population situated about 15 miles to the north-west of Tanga which is on the East African coast in the north of Tanganyika. It is an area of high endemicity and all babies are infected before they are 5 months old. The author concludes that while children suffer from malaria during the first 2 years of life and a few die during the first few months older children cannot be said so to suffer and no evidence was obtained of any harmful effects from malaria during adult life.

Babies during the first month were fat placid and in excellent condition with no parasites in their blood. A month or two later the picture was very different. The children were fretful feverish and evidently ill and the haemoglobin had dropped from about 85 to 45 per cent. The spleen was enlarged as far as the umbilicus and there was a congestive condition of the lungs. The change was partly due to malaria and partly to grossly unsuitable food. This state persisted for a little more than 6 months and then except for the few cases which ended fatally improvement began. The time of first infection with parasites was generally the second month all the babies were infected by the fifth.

During the period of acute infestation which lasts about 18 months the average number of parasites was 7,800 per cmm. and counts of 20,000 were often met with. The number of parasites and the size of the enlarged spleen remained about the same for the first two years but there was very little danger to life after the first 6 months and the degree of anaemia became less before the parasites began to decrease in number. Gametocytes began to appear when the children were 6 to 12 months old, and reached their maximum at the end of the second year. Infectivity becomes a characteristic of these children neither when they are immune nor before they have acquired their

immunity, but when they are in process of the change-over to the immune state. Gametocytes were seldom seen in adults. During the third, fourth and fifth years the children played and ran about as though nothing was the matter with them. They were all infected by the concentration of parasites in the blood ("parasite infestation") was lower and very irregular counts were sometimes as low as 50 per cmm. and sometimes as high as 10,000. During this period the spleen became smaller. The spleen rate between 2 and 10 years was 80 per cent. in adults it was 38 per cent. The infestation rate at the age of 5 was rarely above 1,500 per cmm., and thereafter it declined constantly until about the fourteenth year when it reached 177 per cmm. The parasite rate fell to 68 per cent. at the tenth year and to 43 in adult life. The author is of opinion that "inherited tolerance plays little part in the ultimate acquisition of immunity for nearly all babies suffered from intense infections. Such inherited characteristics as do play any part in the immune process are other of the nature of a power to acquire immunity."

P. falciparum was the dominant infection at all ages but the other species (including *P. ovale*) were also present during the first few years of life and more rarely later. The immunity acquired to *P. falciparum* was less complete than that acquired to other species. The general result of mosquito dissections was a gland infection of 12.2 per cent. but, just after the rains, this figure was much higher and the number of mosquitoes in the houses was greater. This increase of infection was followed, not preceded by, a higher average parasite count (infestation rate) in the population, and 3 months after the rains the gamete rate in children was double what it was before.

H. F.

SCRIVETZ (J.). Observations et recherches sur le paludisme dans le Congo belge. Note sur les groupes d'âge qui sont le plus gratuitement frappés par le paludisme dans les régions hyperendémiques de l'Afrique centrale. [Malaria in the Belgian Congo and drug Prophylaxis.]—Rec. de Malariologia. Sez. I. 1908. Vol. 15 Nos. 1 & 2. pp. 60-75 146-152. With 3 charts. [24 refs.]

Immunity develops with age. The difficulties of drug prophylaxis. The author's earlier conclusions are confirmed by further research. *P. falciparum* is the commonest parasite. All the small children have many parasites in their blood, but in adults, parasites can be found only in thick films. Fifty per cent. of the babies have crescent bodies; these are not found in adults. Quartan parasites are fairly common in infants, but they are rare after 10 years of age. *P. vivax* is abundant in infants but it disappears even earlier than *P. malariae* and is rare after the third year.

The author has learnt from experience that drug prophylaxis is far more difficult to accomplish than is realized by those who have never practised among ignorant natives in the tropics. "The regular administration of drugs can be carried out only under the direct and permanent supervision of a European and, moreover a European who is alive to the importance of the work." His own experiments were carried out among school children.

He found that the results with 0.5 gram (7 grains) of Cuckoo Schreifger's Rocke were rather better than those with 0.25 gram of quinine.

hydrochloride and the cost less. When these doses were given daily over long periods it was possible to reduce the parasite rate from 80 per cent. to about 20 per cent. but not lower

W F

MATTLET (G) Le kapsura ou kafindo-findo [Kapsuro or Kafindo-Findo.]—*Ann Soc Belge de Méd Trop* 1935 Dec. 31 Vol 15 No 4 pp 521-525

This is really malaria.

When Tabora was occupied by the Belgians in 1917 there was an outbreak of cerebrospinal meningitis among the troops which the white Fathers of the Mission maintained was really a native disease known as Kafindo-findo. This disease the Fathers said was characterized by a membrane which formed at the base of the tongue. In severe cases there ensued high fever cerebral symptoms and sometimes death from suffocation. It could be cured by scratching the back of the tongue with a pointed stick and the Reverend Fathers scratched and cured the natives in hundreds wherever the disease was rife among them. The author sought for many years to find typical cases of the disease. It is called Kapsura in Urundi. He was shown cases of rhinopharyngitis among missionaries who had been smoking strong native tobacco and cases of pharyngeal catarrh from other causes. Eventually he heard of some cases at Ruhengeri north west of Ruanda in marshy country full of streams and rushes at an elevation of 6,000 feet. These cases had fever and they had also numerous tertian parasites in their blood. The same was found in all the severe cases of Kapsura, and quinine has now removed the dread of this disease from the missions. The author thinks that malaria was introduced into the highlands by the troops passing through it during the war but Europeans are unwilling to admit that it is really malaria because they affirm that there is no malaria on the plateau and they sleep without mosquito nets to prove it

W F

RUSSELL (Paul F) Epidemiology of Malaria in the Philippines.—*Amer Jl Public Health* 1935. Jan. Vol. 26 No 1 pp 1-7 [24 refs.]

Malaria control is impracticable in many rural areas in the tropics because it is too expensive.

Malaria is responsible for ten to twenty thousand deaths annually in a population of 13 000 000. There are probably about 2,000 000 cases a year. It does not occur in the large cities. About 60 per cent of the infections are benign tertian blackwater fever is very rare and malaria is not such a serious menace as it is in British or Dutch Malaya. Barber found a parasite index of 11 per cent. and a spleen index of 13.3 as the result of examinations made in 14 provinces.

The malaria mortality rates have fallen greatly in the last 30 years the rates were in 1905 662 per 100 000 in 1925 218 in 1932 77. There is no evidence that larval control, quinine consumption or the use of bed nets has been responsible to any extent for this improvement. Probably changed diagnosis has been a factor.

Two anopheles have been incriminated as vectors *A. minimus* var *stictostris* and *A. maculatus*. The latter is zoophilous and rarely spreads malaria in the Philippines. *A. minimus* the carrier feeds with equal avidity on man and buffaloes. It enters houses at night but

is seldom found there in the day. Its effective range is rarely over one kilometre. It breeds in small clear streams and flowing irrigation ditches more often in shady than in open places. It is never found in rice fields or above 2,000 feet altitude. Malaria is chiefly prevalent in the foothills where small streams offer breeding places suitable for this mosquito.

Paris green seems most suitable for combating malaria in the Philippines and it has been used with success in army centres and on estates. Gambusia have been of no value at all. There is hope that malaria may be controlled, in those communities which can afford it, by the use of Paris green, but there are many districts in the Philippines which are too poor for this. The longer one observes malaria in the tropics the more one is forced to conclude that so far as average rural areas are concerned the problem of control is still unsolved. Malaria prevention in the tropics by means of drains and subsoil pipes, larvicide oil, and Paris green is entirely feasible. In cities, organized industrial and agricultural centers, but for most malarious rural areas in the tropics it appears that we have no economically feasible control methods. So far as I know the drugs quinine, plasmoquine and atebenine have never eradicated malaria from an area or even from a single town.

JF

FARINATD (M. E.) La lutte contre le paludisme dans les colonies françaises. "Malaria and Antimalarial Measures in the French Colonies" Ann. de Med et de Pharm. Colon. 1935. Oct. Vol. Dec. Vol. 31. No. 4 pp. 919-960

The author surveys in the first part of this paper the conditions as regards malaria in the different French colonies and mandated territories. In the second part he discusses the methods adopted for its prevention. He considers it waste of time to begin with propaganda when dealing with backward races. First heal the sick, next protect the healthy, then educate. Prophylactic quinine has been taken for years in Africa, it prevents serious illness and death, although it does not prevent malaria. For individuals it is useful, but for collectives of labour under ordinary conditions it is of little value for except in the agricultural colony of Fri-Cu in Tonking 30 per cent. of the natives had parasites in their blood at the end of a year's prophylactic treatment. The results with plasmoquine and atebenine have been rather promising in the case of benign tertian, prophylaxis with the drug may merely render the infection latent but in subtertian, as just has shown, if the attack does not occur within the usual incubation period it means that the infection has been aborted. Unfortunately atebenine accumulates in the body, and therefore it cannot be used with safety in small daily doses over a long period. Drug prophylaxis depends for its success not only on constant and close supervision, but also the community under treatment must be isolated, stable and under strict control every carrier must be treated. Even where mass prophylaxis has been successful, malaria quickly returns to its former level when the drugs are withdrawn. The best results appear to have been obtained with atebenine, and the author thinks it possible that rhodoguanine and quinacrine the French forms of plasmoquine and atebenine may be used in the French colonies instead of quinine. At present between 7 and 8 tons of quinine are used annually in French possessions at a cost of more than 3 million francs a year.

JF

FRÉVILLE (L. H.) & NGUYEN VAN LEONG Quelques nouveaux cas de contaminations paludéennes au cours de pèlerinages au mont Baden (Tayninh) — Bull Soc Méd-Chirurg Indochine 1935 June Vol. 13 № 5 pp 562-569

MICKAŁIEWSKI & HAI Enquête sur le paludisme dans la province de Batie — Bull Soc Méd-Chirurg Indochine 1935 June Vol. 13 № 5 pp 543-557

RISTORCELLI Note sur le paludisme dans la région de Tatahouine — Tunisie Méd 1936 Mar Vol. 30 № 3 pp 119-122. With 3 figs.

UNION OF SOUTH AFRICA. ANNUAL REPORT OF THE DEPARTMENT OF PUBLIC HEALTH FOR YEAR ENDED 30TH JUNE 1935 [THORNTON (E. N.) Secretary] Malaria.—A. Control in Natal and Zululand B. Transvaal Field Station. C Railway Areas pp 29-32. Malaria pp 82-85]

We have been driven to employ hut-spraying during the malaria season as our main weapon over extensive sections of the country and after a two-years trial on the large scale are satisfied that the disease can be controlled by it in Natal and Zululand. It is essential however that (a) hut-spraying commence as soon as adult *gambia* or *stintosius* begin to enter dwellings (b) it be applied to every habitation over the area to be dealt with and that such area be as large as possible (c) every dwelling be thoroughly sprayed at least once weekly but preferably bi-weekly our method can only be successful when the vectors are in the habit of frequenting houses Reduction in the infectivity rate may be very marked It was below 1 in 1 000 of anophèles gorged with human blood in native areas formerly affected by malaria This work was begun in 1932-33 with a pyrethrum insecticide Many natives who were formerly hostile have now become convinced that malaria is associated with anophèles and they have begun to limit mosquito breeding by draining and restricted oiling The author does not advise that complete reliance should be placed on insecticides alone in those closely settled communities where antilarval measures can be carried out but over a large part of the country and particularly in native reserves antilarval measures are quite impracticable The Railway Department put in 4 762 yards of subsoil drains and 13 000 yards of earth drains during 1934-35 During the winter dry season arrangements were made to treat all relapse cases occurring in the native reserves Municipalities and boroughs depended mainly on larval control supplemented in every case by spraying of dwellings with insecticides On the coast north of Umfolosi, which is a highly malarious area, in accordance with Professor Swellengrebel's advice no organized control measures were attempted lest they should tend to destroy the degree of natural immunity attained by the native population Here there was no improvement in the malaria position during 1934-35 but elsewhere the results of measures taken are so striking that provided they are kept up we can count on a practical elimination of the disease in the country south of the Umhlatuzi River in Zululand and in the controlled area to the north of that river In the coastal area, malarial incidence was much less than in previous seasons though there was little reduction in the numbers of *A. gambiae*

Seepage areas are dealt with in some areas by planting trees to promote drying and absorption natives have been induced to plant jatoba trees (*E. saligna*) and the Native Affairs Department has set aside an annual sum for the establishment of plantations. Screening of doddings and public buildings is widely used. Monel metal is used by the Railway Administration in Natal and bronze gauge in the Transvaal. The insecticide employed is "Pyagra" diluted 1 in 17 with paraffin [see this Bulletin 1935 Vol. 32, p. 393].

H. F.

S. HARFF (J. W.) Anti-malarial Drainage from the Point of View of the Health Officer Parts I & II.—*Malaysian Med. J.* 1933 Dec Vol. 10 No. 4 pp. 119-137 With 15 figs. & 1 diagram.

A practical knowledge of drainage technique is as necessary to malaria field-workers as is the study of mosquito ecology". His knowledge is not easy to come by and, in this series of papers which deals with the theory and practice of anti-malaria drainage the author has done great service to his fellow-workers in malarious countries. He emphasizes the need for proper control of general anti-mosquito and anti-malaria measures. It has happened far too often, he writes, that spasmodic efforts on the part of local authorities, while leading to some success, fail in the end for lack of continuity and bring discredit upon measures which would command success if well carried out. He first considers the different types of soil, the size of their particles, the air-space between the particles and the influence of these factors upon permeability. Next he discusses water in its relation to soil particles and the water table in its relation to the formation of springs and seepages. Drainage removes the excess of water from the soil and the water is replaced by air. Subsequently each fall of rain refills the "pore spaces in the soil with water which in turn again gives place to air. This phenomenon is the aeration of the soil so important to agriculturists. Without this process of aeration, the organisms which convert the oxygen and nitrogen of the pore-spaces to the use of the plants cease to work—the useful plants die and are replaced by weeds which are specially adapted to grow without soil air. Drainage sweetens the soil, the farmer says—in some places it removes the excess of alkali—in others it removes the excess of organic acids. Drainage not only reduces the amount of malaria, but at the same time, it enriches the land and the people. Filling is justified in places where in addition to reclaiming a dangerous swamp, a good housing scheme is made possible—but only under exceptional circumstances should filling be debited to an anti-malarial budget. Apart from such large schemes the author does not recommend filling in the Malay States. The material employed is often impervious—springs and seepages reappear on the top of the filling and owing water spreading over it continues to afford numerous breeding places for dangerous anophelines.

The second part of this paper deals with "The Principles and Objects of Land Drainage in Connection with Anti-Mosquito Projects." It begins with a description of the effect of drains upon the movement and level of the subsoil water. Without water it is impossible to grow crops, but too much water may be as bad as too little. Even wet rice cultivation forms no exception to this rule and though such land must at certain seasons be flooded for the growth of a crop of rice, yet at other seasons surplus water must be removed in order to aerate the

soil. The reason for the inhibitory effect which this slowly alternating flooding and drying has on the breeding of malaria-carrying mosquitoes is not at present understood. The influence of geological features such as the arrangement and permeability of the strata, on drainage is next discussed this is followed by a consideration of practical drainage problems such as the drainage of ponds lakes and swamps and examples are given of different methods which have been employed with success in dealing with special cases. For example dangerous anopholes were found breeding in the puddles formed by the drippings from stand pipes in Penang where the surface layer of the soil is impervious with a pervious stratum underneath. Drainage was successfully accomplished by sinking a shaft with the bore-hole auger used in latrine construction through the impervious layer into the pervious stratum beneath. This article which is illustrated with numerous diagrams and sketches will be continued in a later number W F

SCHARFF (J W) On a Method of planting and growing Grass in Connection with Anti Malarial Drainage Projects — *Malayan Med Jl* 1935 Dec Vol 10 No 4 p 153

One of the difficulties in draining hill land is to maintain the drained surface undamaged under frequent falls of rain. In the Malay States grass has been found the best protection. The efficiency of anti malarial drainage frequently depends upon the quickness with which grass plants can be induced to take firm hold upon the soil. It is necessary to plant a creeping grass to provide the necessary stability A method used in the Dindings is as follows Thin sods of grass are cut about 2 feet square they are rolled up like a jam roll and chopped into small sections 1½ to 2 inches square. These are thrown into a barrel half full of a mixture of cow-dung and water which has been allowed to mature for at least 2 days. The mixture should have the consistency of thick porridge. The surface which requires turfing is beaten down quite flat and is plastered with a layer of the mixture about $\frac{1}{2}$ an inch thick. On the following day it is watered and on the third day blades of grass begin to appear Avoid planting in stormy weather Do not scythe the grass until 2 months later W F

Rochefort Deux années de lutte contre les moustiques au centre d'aviation de Rochefort [Two Years Antimosquito Work at the Rochefort Aviation Centre] — *Arch Med et Pharm Nav* 1935 Oct - Nov - Dec Vol. 125 No 4 pp 545-582 With 26 figs. 1 folding map & 2 plans

Prevention of mosquito-nuisance by ordinary methods carried out with enthusiasm and success. Waste oil from the aeroplanes is used The naval aviation centre and school for army air mechanics is situated outside the town of Rochefort in a loop of the river Charente not far from its mouth. It is surrounded by flat marshy land. The new buildings required in connexion with the aerodrome and school have interfered with the natural drainage which is difficult in any case owing to the flat low lying land. The breeding places of the mosquitoes are largely man-made for instance, a large stagnant pond in connexion with the electric light works. An enormous amount of culicine breeding takes place in sewage from water closets latrines and septic tanks. Mosquitoes have been so numerous as to prevent sleep

at night. In days gone by malaria was a serious disease in Rodel and there are still a few cases every year. There were 22 cases 1924 and 1928. They were all due to *P. vivax*. The author observed two cases in 1934. *A. maculipennis var. atroparvus* is found in buildings they do not breed in the government aerodrome area, both neighbouring farms situated in the marshes outside the camp. A great deal has evidently been accomplished in the way of filling up pools and cleaning up streams and drains.

Screening is provided in some of the barracks, and the dormitories are sprayed with insecticide. An almost unlimited supply of water from the aeroplanes is available for spraying, and this is used in dry tanks and sprayers. The results have been excellent and in some places where mosquitoes were present in hundreds, there are now none. In the ditches of the farms just outside the camp anophèles cannot breed.

W F

SATTET (Jacques). Cinq années de lutte antimalarique dans le nord de la Corse. [Five Years' Antimalaria Work in North Corsica].—*Rev d'Hyg Trop* 1933. Jan.-Feb. Vol. 23. No. 1. pp. 3-30

The anti-malaria service was inaugurated in 1930. The author was the Director of the work in the northern half of the Island with headquarters at Bastia and about 20 dispensaries scattered over the country. Mobile units visited the dispensaries, sought out the infirm people examined and card indexed them and prescribed the treatment to be carried out locally with quinacrine or quinine, and rhodochrine. In rural districts, Gembans were introduced into breeding places in populous centres, Paris green was employed. Supervisors on motor-bicycles covered large areas inspecting the work carried out by the labourers. The results were good during the first two years, but they were less good in 1934 and 1935 owing to an influx of Italians and other foreigners for employment on public works, and also because anti-malarial work had been suspended owing to lack of funds.

W F

BALFOUR (M. C.). Some Features of Malaria in Greece and Bulgaria with its Control.—*Riv d' Malariologia* Ser. 1 1936. Vol. 15. No. 2. pp. 114-131

Drainage better than drugs. Fewer relapses after atebrin than after quinine, but fewer relapses after atebrin plus plasmoquine than after atebrin alone.

Observations on malaria in Greece have been made since 1928 in five principal "field study areas" which have been established in Attica, the Peloponnesus, Central Greece, Macedonia and Thrace. An important point which has been established is that natural fluctuations occur in malaria which varies from a mild endemic to a severe epidemic form. Meteorological conditions have the greatest influence in determining the situation. The winter rains, and the snow which falls on the mountains, are the foundation upon which the following malaria season develops. When a wet spring is superimposed on a wet winter a bad malaria season will probably follow.

A

dulus is the most important vector. *A. superpictus* is also a dangerous carrier. *A. maculipennis* is very numerous but much less important. The average rates of infection with sporozoites during the 3 years were *A. dulus* 1.29 per cent., *A. superpictus* 0.84 per cent., *A. maculipennis* 0.07 per cent. The first two fly for long distances up to 5 kilometres, and at some places in central Greece it has been necessary to extend antilarval measures to a radius of 5½ kilometres (3½ miles). New infections occur from the middle of May to the middle of October. In ordinary years infections with each of the three types of parasite occur in equal proportion but in epidemic years *P. falciparum* infections predominate. As regards the effects of malaria upon the population in ordinary years though the spleen index may be about 70 and the parasite rate about 30 there is very little illness but in epidemic years every one suffers. It is now recognized in Greece that quinine is a therapeutic and not a preventive measure. The use of quinine has been and will continue for years to be the backbone of relief for the majority of malarious communities. Comparative tests were made with quinine, atebrin and plasmoquine 0.02 gram plus atebrin. The relapse rates were 45 per cent., 30 per cent. and 8 per cent. respectively. The author is of opinion that 10 days is the optimum duration of quinine treatment five days he considers too short.

The malaria worker soon arrives at the conclusion that in Greece as elsewhere drainage operations large and small are the basis of permanent antimalaria efforts. In the Struma Valley a drainage project costing about \$20 000 000 is also nearing completion. Drainage supplements and gradually takes the place of Paris green.

W F

RICE (E. Milford) Observations on Malaria in Assam, with Special Reference to Cold Weather and Pre-Monsoon Anti-Larval Control.—Records of the Malaria Survey of India 1935 Dec. Vol. 5 No 4 pp 371-388. With 4 graphs [16 refs.]

Anti-larval measures in Assam should be carried out during the first half of the year instead of from March to November.

The period at present generally advocated for the application of anti-larval control is from March 15 to November 15. *A. minimus* the only carrier breeds in clear running water. On many estates the breeding area is limited to one or two small streams and the breeding time is limited to the period January to June. When the monsoon breaks in June these streams are flushed out with muddy water and breeding ceases. On some estates breeding proceeds in the same way until the beginning of the monsoon but instead of coming to an end it continues in monsoon streams, drains and other suitable places with the result that the malaria season continues for a longer period. The author concludes that the breeding of *A. minimus* from early January to mid-June is the principal factor responsible for the incidence of malaria and that transmission in the cold weather is the cause of the April rise. He suggests that anti-larval measures applied during this period would be more economical and efficient than those applied in accordance with present practice from mid-March to mid-November. Estates with no breeding places in their area have no malaria though breeding may be taking place at a distance of a half to two miles. The usual flight distance of *A. minimus* is therefore not more than half a mile. W F

RICE (E. Millard). Anti-Larval Oil Application by a "One Man Brushing Method."—*Records of the Malaria Survey of India*. 1936 Dec. Vol. 5 No. 4 pp. 499-500. With 2 figs. on 1 plate.

This is a modification of Quattle's brush method of oiling. The author attaches a bamboo brush to the nozzle of a Knapack Soil Sprayer by means of two motor-car hose-pipe connection fittings. In two operations the application of the oil and its distribution with the brush, can therefore be carried out by one cooly instead of two. W F

WHITE (R. Senior). Malaria Control by Subsoil Drainage at Walti.—*Records of the Malaria Survey of India*. 1936 Mar. Vol. 6 No. 1 pp. 13-18. With 5 figs. & 1 diagram on 2 plates.

Peasants object to Paris green on their paddy-fields.

For some years, earth drains and oiling were employed. Early in 1932 the conversion of the open drains into subsoil drains was begun. The drains were deepened to 3 feet, flat sided stones were laid to form a tunnel over which smaller stones were placed, gradually decreasing in size towards the top. The whole was topped off with earth in which grass was planted. The subsoil drainage proved more efficient and less costly than the open drains and oiling. On one side of the town there were 30 acres of paddy which was regularly dusted with Paris green. The peasants strongly objected to this and, after the dusting had been going on for a year they refused to let it continue. The land was eventually bought by a speculator for building purposes. W F

EJERETTO (Antonio). Malaria and its Control in the Philippines.—*Monthly Bull. Bureau of Health*, Manila. 1935 Aug. Vol. 15 No. 8 pp. 253-258.

Systematic larval control was begun in 1926, and Paris green was employed as a larvicide over an area with a radius of 1½ miles (nearly a mile) around the communities to be protected. In most localities the results were good, but in others they were a failure, and it is suggested that the radius controlled was not extensive enough to prevent anophelis reaching the dwellings at the centre. After 10 years of Paris green control, this method has been abandoned except in certain places where money is available elsewhere, reliance being on the use of mosquito nets and the treatment of the sick. W F

WALCH (E. W.) & SOESILO (R.). Malaria Control in the Netherlands Indies.—*Meded. Dienst d. Koloniale gezondheid in Nederlandsch Indië* 1935 Vol. 24 No. 3 pp. 86-94. With 15 figs. (11 on 6 plates).

This paper was published in the Transactions of the 9th Congress of the Far Eastern Association of Tropical Medicine and Hygiene, and is summarized in this Bulletin 1935 Vol. 32, pp. 728-29. The paper under review contains some good photographs and a picture of *Puntius jerdoni*, the fish which feeds on pond vegetation. This note is inserted because the Dutch Journal is easier to obtain for reference than the Transactions of the Far Eastern Association. W F

GOLDFEDER (A. E.) Malaria und Auge. 4 Mitteilung Ueber ein allgemein zugängliches Augensymptom der chronischen und larvierten Malaria [Malaria and the Eye].—Arch f Schiffs u Trop Hyg 1936 May Vol. 40 No 5 pp 207-211 With 3 figs.

A new eye symptom is described by the author in latent and chronic malaria.

In the protozoological Institute of the Ukraine the melanoflocculation reaction of Henry has been employed in the diagnosis of malaria and the author considers it possible that with improvements the reaction may become as specific for malaria as the Wassermann reaction for syphilis. As another comparatively easy method of diagnosis of malaria the author describes an eye symptom which can be readily recognized by the general practitioner. He describes it as a symptom of malarial eye blood vessels. It consists of the presence of peculiar and unusual blood vessels in the conjunctiva of the eyeball. He describes and illustrates the appearance in detail. The changes generally occur in one eye but sometimes both eyes are affected. He describes his method of demonstrating the appearances. He considers that this eye symptom which he describes, is as pathognomonic for malaria as Hutchinson's teeth are for congenital syphilis.

The vessels are superficial and in fact appear as if raised above the surface of the ocular conjunctiva they are generally of larger calibre than the other conjunctival vessels and though they vary in depth of colour they are always darker than the other surface vessels. If the eye is directed straight forwards the vessels have a wavy outline (spiral or corkscrew shaped) if the eye is moved to the opposite side they are drawn out like strings [*i.e.* straightened] (Fig. 1) they do not divide dichotomously like other conjunctival vessels but as they approach the sclero-corneal junction either divide each into two running parallel

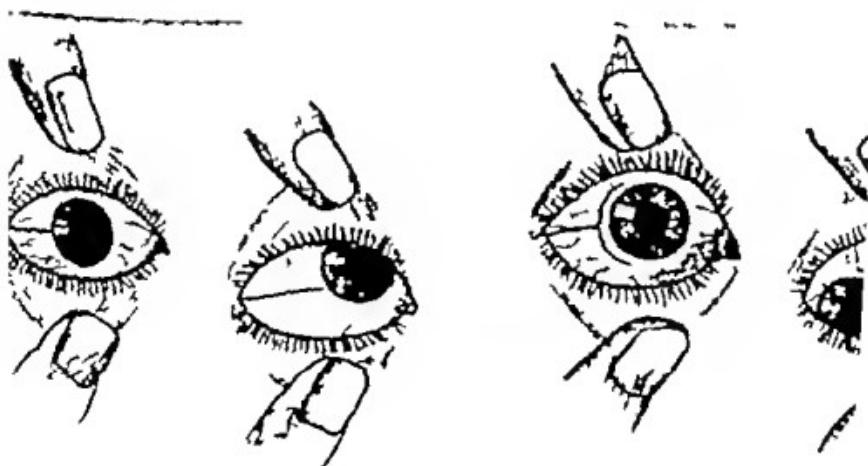


Fig. 1
Unusual blood vessels in the conjunctiva of the eyeball, described by Goldfeder as pathognomonic for malaria.

[Reproduced from the Archiv für Schiffs und Tropen Hygiene.]

round the corners, or without dividing, turn sharply to run parallel with the corneal margin (Fig. 2) they do not anastomose with other vessels but are lost in the formix of the conjunctiva.

To those specially interested the paper may be consulted in original and the figures therein studied.

E D W Gray

BHATTACHARJEE (N. C.) A Case of Malaria with Acute Marsh.
Indian Med Gaz. 1835 Dec. Vol. 70. No. 12. p. 686

A patient with subtertian malaria became so violent that it needed four men to hold him in bed. He talked nonsense kept his eyes tightly closed and resisted all attempts to open them his temperature was between 99.4 F and 101 F. He improved rapidly on quinine and in about 24 hours the symptoms had disappeared.

IT F

GROSSMANN (J.) & SOLONOV (Eug.) Quatre cas de syndrome appendiculaire d'origine paludéenne. [Four Cases with Symptoms of Appendicitis due to Malaria].—Bull. et. Mem. Soc. M. H. Bucarest 1936 Jan. Vol. 18. No. 1 pp. 10-18.

The authors review former observations of this condition and relate the history of their four cases. The signs which put them on the track of a correct diagnosis are leucopenia in a case resembling appendicitis together with a good general condition and a pulse corresponding with the temperature. The presence of parasites greatly strengthens the diagnosis but does not rule out appendicitis entirely. The symptoms disappear under quinine if they are due to malaria.

IT F

See also p. 369 VENTKOCHEILAN Septicemic Plague simulating Malaria.

THOMAS (W. L.) & KERS (S.) Accidental Transmission of Malaria by Blood Transfusion. With a Note by S. C. DIXON.—Lancet. 1935 Mar 7 pp. 536-537 [12 refs.]

Transfusion with citrated blood by means of a three-way syringe was performed on August 24th and September 9th, 1935. Eight ounces of blood were inoculated on the first occasion and ten on the second. On September 12th, the recipient developed a hot intermittent fever with rigors. On September 19th, the blood was examined for malaria parasites and *P. vivax* was found. The donor had served as a soldier in India from 1927 to November 1933. No parasites were found in his blood and he had never so far as he knew suffered from malaria, but in June 1934 he had had a short series of shivering attacks each lasting 2 or 3 days.

IT F

DAT (L. F.) Quinine and Otosclerosis.—Malawea Vol. II. 1935 Mar Vol. 11 No. 1 pp. 53-64

The author describes 3 cases of otosclerosis which began with progressive deafness and tinnitus following a course of quinine treatment. Two of the patients were schoolmasters, one 28 and the other 25 years old, who could not hear a speaking voice more than 3 or 4 feet away. The third patient was a Chinese shopkeeper aged 45. It is suggested that the deafness was due to the effects of the hypertension produced by large doses of quinine. This causes absorption of circumscribed areas

of bone around the labyrinth, which are later replaced by new spongy bone. When once the bony changes of otosclerosis have begun, they progress. Eventually the stapes becomes ankylosed to the oval window and the bony changes spread to the cochlear region. degeneration of the auditory nerve follows.

W F

DANG (M-Gieu) HEMENWAY (Ruth V) & LAU (Stephen) Report of Nine Hundred and Sixty Cases of Malaria in Mintsing Fukien.—*Chinese Med Jl* 1935 Nov Vol 49 No 11 pp 1235-1240

YU (E. M) & PARK (R. M) Jr A Review of 203 Malaria Cases.—*Chinese Med Jl* 1935 Nov Vol 49 No 11 pp 1228-1234

SICAULT (H) & NESSERLIN (H) Observations de quelques cas de néphrite quartane avec syndrome de rétention chlorurée—*Bull Soc Path Exot* 1936 Mar 11 Vol 29 No 3 pp 288-274 [18 refs]

ZIMINE (E) Un cas de pleurésie hémorragique d'origine paludéenne—*Bull Soc Path Exot* 1936 Mar 11 Vol 29 No 3 pp 267-268

RANKOV (M) Die Verteilung des *Plasmodium vivax* und *Plasmodium imminatum* bei verschiedenen Altersgruppen [Distribution of *Plasmodium vivax* and *imminatum* in Different Age Periods]—*Arch f Schiffs u Trop Hyg* 1936 July Vol 40 No 7 pp 277-289 With 14 figs.

The author made his observations in southern Jugoslavia in 1924. He examined in all 442 cases of which 44 per cent were benign and 56 per cent. malignant tertian malaria. He studied the distribution of the infections in the various age periods and his paper is illustrated with diagrams and tables.

He concludes that the percentage distribution of benign and malignant infections in the age groups in southern Jugoslavia is markedly different. There is a quite regular fall in the percentage of benign tertian with increasing age and a corresponding increase of malignant tertian. He thinks the explanation of this phenomenon lies in the different speed and degree of development of the resistance of the organism.

E D W Greig

PANDIT (S R) The Morphology of Malarial Parasites.—*Records of the Malaria Survey of India*. 1935 Dec Vol 5 No 4 pp 389-392. With 63 coloured figs. on 2 plates.

Thin films were exposed to the vapour of osmotic acid while they were still wet by inverting the slide over the open mouth of a bottle containing a 2 per cent. solution of osmium tetroxide in 1 per cent. chromic acid. The films were fixed in methyl alcohol and stained with Giemsa. Coloured plates are given in which such preparations are compared with ordinary air-dried films. It is suggested that fixation of wet films over the vapour of osmotic acid gives a truer picture of the parasites.

W F

IVANIC (Montilo) Ein neuer Beweis für den ursprünglich promitotischen Charakter der Kernteilung beim Tertianparasiten (*Plasmodium vivax* Grassi et Feletti) [Fresh Proof of the Primitive Promitotic Character of Nuclear Division in *Plasmodium vivax*]—*Zent. f. Bakteriol. Abt. Orig.* 1936. Feb. 13. Vol. 136. No. 12 pp. 109-111 With 1 fig

The title describes the nature of this communication. The author obtained his material for investigation from a 10-year-old-boy who was very heavily infected with benign tertian malaria. The blood films were stained by Giemsa's solution—method of fixation is not mentioned.

He concludes that the nuclear division occurring during the schizont phase of the *Plasmodium vivax* is promitotic in character and, probably this character is constant in this parasite. From this he holds that some support has been found for the view that the malaria parasite arises from a lower rhizopod which regularly divides by promitosis, hence it appears that malaria infection originally took place by oral ingestion, which makes the mosquito theory questionable.

E. D. W. Goss

IVANIC (Montilo) Ein neuer Beitrag zur Kenntnis der Kerntheilung beim Tertianparasiten (*Plasmodium vivax* Grassi et Feletti. "Nuclear Division in *Plasmodium vivax*"]—*Zent. f. Bakter. I. Abt. Orig.* 1936. June 12. Vol. 136. No. 7,8 pp. 418-420. With 1 fig.

A study of nuclear division in *Plasmodium vivax*

The author refers to his previous communication dealing with the subject and the present paper is a continuation of the investigation. Two mitotic nuclear division stages of *Plasmodium vivax*, one early the other late are described. He states that he again proves and that the original promitotic of *Plasmodium vivax* changes into a true mitosis.

E. D. W. Goss

LINTWARTER (J. J.) Beiträge zum Stadium der Malaria-pathogenese. "Study of the Pathogenesis of Malaria."—*Arch. f. Schiffs- u. Trop. Hyg.* 1936. Feb. Vol. 40. No. 2 pp. 63-73.

A study of the part played by haemoglobin in the pathogenesis of malaria.

The author refers to his work on the significance of haemoglobin in pathology. He considers that the toxin formed by the malaria parasite is adsorbed by haemoglobin of the red cells, and passes into the blood plasma. The haemoglobin combined with the malaria antigen circulating in the blood stream causes a hyperplasia of the reticuloendothelial tissue, especially that in the lungs and mesentery whereby the antigen in this tissue becomes transformed into malarial antibodies. He suggests that this hyperplasia and hyperfunction of the reticuloendothelial tissue explains the beneficial effect of malaria therapy in metacercarial diseases. The RE tissue produces not only anti-malarial but also anti-syphilitic bodies. The haemoglobin-toxin is taken up by the cells of the renal tubules causing cloudy swelling (nephrosis). The iron from the disintegrated haemoglobin gives a beautiful Berlin blue reaction in the renal cortex. The haemoglobin-toxin also attacks the intima of the blood vessels in the mucous membrane of the intestinal canal producing thrombosis of the small vessels, resulting in necrotic lesions in the large and small intestines. By the action of the toxin on the walls of the small veins leakage occurs, resulting in numerous

extravasations in the pleura peritoneum epicardium and brain these are usually minute but at times larger haematomas take place

E D W Greig

JACOBSTHAL (E) Die Infektion der Reticulocyten durch Malaria plasmoidien. [Infection of Reticulocytes with Malaria Parasites.] —*Klin Woch* 1936 June 27 Vol. 15 No 26 p 942.

Description of simple stain for reticulocytes and of the results obtained with it in malarial infections.

The author's stain is a modification of the Hirschfeld method. The procedure which is very simple and easily applicable in practice is as follows — Blood films are stained with Loeffler blue (2-3 minutes) at the end of this time they are well washed in water then stained 5-15 minutes in ordinary dilution of Giemsa. Washed in distilled water and dried in air. Fixation after Loeffler with saturated watery solution of perchloride of mercury may be employed although finer results are obtained with unfixed films the latter are not so good for permanent preparations as the fixed films.

Employing the above technique the author found that in infections with *Plasmodium vivax* and *falciparum* the parasites selected the young red cells 90 to 98 per cent. of infected cells were reticulocytes. This he considers of considerable clinical importance as a number of these young red cells are destroyed and so anaemia is produced. He also noticed that the reticular structure of infected reticulocytes was altered. He stresses the point that to get good results the films must be fresh.

E D W Greig

SARKISIANE (A. B.) La moucheture de Schüffner et le ponctuage de Maeter dans les erythrocytes dans les cas de leur coloriage par le nitroblausulfate-azur-éosine —*Folia Haematologica* 1936 Feb Vol. 54 No 2/3 pp 145-149 With 2 figs

SICCI (A.) & ROBIN (Ch.) A propos du *Plasmodium falciparum* et de ses formes atypiques —*Marseille-Med* 1936 Feb 5 Vol. 73 No 4 pp 137-139

BOYD (Mark F) STRATMAN THOMAS (W K) & MUENCH (Hugo) The Occurrence of Gametocytes of *Plasmodium vivax* during the Primary Attack.—*Amer Jl Trop Med* 1936 Mar Vol. 16 No 2 pp 133-138.

A tertian malaria patient with an attack of average duration or better is almost certain to be highly infectious for anophelines at some time during his attack.

Gametocytes were invariably found at some time during the disease when its duration exceeded 16 days. Parasites rarely appeared earlier than the 10th day after inoculation by mosquitoes. Gametocytes were seen occasionally on the first occasion that the blood was positive, but never earlier than the 14th day after inoculation. Subsequently gametocytes were produced in showers which occurred at regular 5-day intervals on the 19th, 24th, 29th, 34th and 44th days. None was observed on the 39th day.

W F

DE ALDA CALLEJA (M.) Estado actual de los estudios sobre ineflocculación en el paludismo. (Reacción de Henry). [Present Views on Henry's Reaction in Malaria.]—*Noticias Palas Céleste*. Madrid. 1936. May Vol. 9 No. 5 pp. 203-236. With 5 figs. [104 refs.]

The author describes Henry's original reaction and subsequent modifications of it, the technique of its performance, sources of error, interpretation of results, records of previous investigators, and the value of the reaction in clinical practice diagnostically, prognostically and in evaluating the results of treatment.

He sums up the present position as follows—

1. Henry's reaction is a valuable aid in diagnosis of malaria, provided the deviser's instructions are followed.

2. It is of service in gauging the progress in the course of treatment, if series of curves be plotted, and these curves are also useful in detecting relapse.

3. In the invasion stage after accessions of fever the reaction is positive in 100 per cent. in chronic malaria, results recorded have been varying, but with a high percentage positive.

4. The modified reaction is simple and consequently of use in clinical and in epidemiological studies.

5. The pH has but little influence on the reaction.

6. The proportion of non-malaria patients such as syphilitic, tuberculous and leukaemic, reacting is small, but a positive result is sometimes obtained in protozoal infections, such as kala azar.

There is an extensive bibliography.

H H S.

GROCHVILI (I.), KERQUELOURHET (I.) & NOUZALIS (M.). La réaction Henry dans le diagnostic du paludisme. [Henry's Reaction in Diagnosis of Malaria.]—*Med. Parasit. & Parasit. Du. Mosc.* 1935 Vol. 4 No. 6. [In Russian pp. 458-481] French summary p. 481.]

The authors carried out the melanoflocculation test on patients at the Institute of Tropical Medicine of Georgia. They tested 259 cases of malaria, 225 with other diseases and 27 healthy subjects. The reaction was positive in 95 per cent. of the first group, in 10.6 per cent. of the second, but was negative in all those in health.

H H C.

WEISSER (H.). Ueber die serologische Verwirrung der Malaria-diagnose. Seroflocculation.—*Dtsch. Med. Woch.* 1936. Feb. 21. Vol. 62. No. 9 pp. 347-350 [11 refs.]

PRAUDHOMME (R. O.). Flocculation des sérums dans l'eau distillée et réaction de Henry. [The Flocculation of Serums in Distilled Water and Henry's Reaction.]—*C. R. Soc. Biol.* 1935. Vol. 129. No. 39. pp. 944-948.

The substance which is flocculated by Henry's melanine is the same as the substance flocculated by distilled water in "surfflocculation". It is present in all serums, but is increased in malaria.

In Henry's reaction to the serum, diluted 1 in 5 with distilled water melanine is added to the first tube and formal to the second which serves as the control. In a "surfflocculant" serum, flocculation occurs in the distilled water control. If, in such a serum, one separates, by centrifuging, the floccules appearing in the distilled water tube, redissolves them in the same quantity of normal saline and then applies

Henry's reaction the result is positive. If the supernatant fluid from the centrifuge be tested, it is found to be no longer positive. If a serum be examined which gives a precipitate in the melanine but not in the distilled water control tube it will be found that flocculation will occur in the latter when more distilled water is added say to 1 in 10 instead of 1 in 5. If this precipitate be centrifuged off and dissolved in saline to a dilution corresponding to the original 1 in 5 it will give a positive Henry's reaction. With normal sera negative to Henry's reaction, flocculation will not occur when one dilutes with distilled water up to 1 in 10 or so but if one dilutes up to 1 in 40 or more flocculation appears. If this substance precipitated from normal serum by distilled water be centrifuged off and redissolved in a small quantity of salt solution this solution will give a positive result with Henry's melanine. The author concludes that a malarial serum differs from a normal serum only by reason of its greater content of a substance which is precipitable by distilled water. When this substance is present in great quantity the serum is surflocculant i.e. flocculation occurs in 1 in 5 of distilled water. When it is present in smaller quantity flocculation is rendered macroscopically evident at this dilution, only in the presence of an indicator such as carmine or Henry's melanine. This substance is normally present in all sera, and it is not surprising to find all grades between a normal serum in which precipitation occurs only when a large quantity of distilled water is added and a malarial serum in which precipitation occurs on the addition of very little.

H. F.

TRENSZ (F) Sur les différences d'activité que présentent la melanine l'eau distillée et différents indicateurs dans la réaction de Henry [Differences in Activity displayed by Melanin, Distilled Water and Various Indicators in Henry's Reaction.]—*C R Soc Biol* 1938 Vol. 122 No. 21 pp. 666-668.

In a previous communication the author adduced evidence showing that in Henry's reaction the melanin unites with a fraction of euglobulin to form a flocculating compound. He now shows that this melanin euglobulin flocculum, unlike the flocculum produced by distilled water or 0.3 per cent. NaCl solution, is insoluble in 0.9 per cent. NaCl solution. Melanin is not an inert substance as are certain coloured pH indicators for example, which disclose the existence of a state of things without influencing it. Melanin on the contrary intervenes actively in certain conditions of instability producing precipitation it acts as a reagent. Its colour would be of no significance or interest were it not for photometric methods of examination.

Henry's reaction was carried out in the case of 57 malaria patients comparing the action of melanin albuminate of iron and saccharate of iron with the action of various coloured indicators and dyes —carmine, indigo-carmine, diamantfuchsin, phenol sulphophthalein, methylene blue, methyl orange, thymol-sulphophthalein, gentian violet, dahlia violet, methyl orange III, Bengal red, bromo-thymol blue, bromocresol purple, rosaniline, Bismarck brown, toluidine blue, crystal violet. Melanin and the iron salts alone exhibited flocculating properties. The saccharate of iron is very active but difficult to titrate. The indicators and dyes used were found to be completely inert. [See also this *Bulletin* ante pp. 266-287.]

Norman H. White.

BENYAMOU (Ed.) & GILLE (R.) Les facteurs chimiques de la malarié-flocculation (réaction de Henry) dans le paludisme atopique. [The Chemical Factors of Henry's Reaction].—C. R. Soc. Biol. 1935. Vol. 120 No 40 pp 1259-1261

Analysis of the serum in malaria shows an increase of euglobulin and a decrease of serum-albumen and cholesterol. Henry's reaction is dependent upon the quantitative relation of these three substances to one another. The authors express this relation as a fraction:

euglobulin

serum albumen \times cholesterol which they term the "index of floccability". In normal blood this equals from 0.01 to 0.05 and Henry's reaction is negative when it is above 0.1 Henry's reaction becomes positive. For example, the index in a case of benign tertian was

euglobulin 4.5

serum albumen 23 \times cholesterol 0.75 = 0.26, and Henry's reaction was positive. After treatment with quinine the index was

euglobulin 3

serum albumen 49 \times cholesterol 1.5 = 0.04 and Henry's reaction was negative

IT F

VILLAIN (G.) & DUCROUX (R.) Contribution à l'étude sérologique du paludisme (Première note.) Préparation d'une melanine artificielle (M.A.) et principe de son application à la réaction floccante de Henry. [Henry's Reaction. Preparation of an Artificial Melanin. (M.A.)].—Bull Soc Path Expt. 1935. Dec. 11. Vol. 23. No. 10. pp. 915-921

Introduce successively into a dry flask —

Tyrosine Poalenc	"	"	"	0.30 gms.
Purchlorure de fer (sulfat officinalis)	"	"	"	0.40 cc.
Eau oxygénée 12 vol	"	"	"	10.00
Eau distillée	"	"	"	10.00

Plug with cotton and shake. Leave for 15 minutes. Bring about to the boil and boil quietly for 1 minute. Pour the hot liquid into a 50 cc. flask containing 180 cc. of boiled, distilled water which is still hot, and boil quietly for 3 minutes.

Cool the flask rapidly under the tap.

After 30 minutes, add 3.20 cc. of 1/1 caustic soda.

Leave for 12 hours at the temperature of the laboratory and filter through a moistened paper.

The dark brown filtrate is the M.A.

It behaves in almost exactly the same way as Henry's melanine.

IT F

VILLAIN (G.) & DUCROUX (R.) Contribution à l'étude sérologique du paludisme. (Deuxième note.) Technique de la M.A. flocculation. (Troisième note.) Résultats obtenus dans la pratique de la M.A. flocculation et conclusions. [The Serology of Malaria. Tests with Artificial Melanin.—Bull Soc Path Expt. 1936. Feb. 12. Vol. 28 No. 2 pp. 121-124 124-130.

The authors describe the technique of their modification of Henry's reaction with the use of an artificial melanin which they call M.A. (see above). They conclude that the results with M.A. and with Henry's ox-melanin are approximately the same. They suggest that

their method should be substituted for the original more complicated procedure in out stations and should be used as a confirmatory test in central well-equipped laboratories. They found the reaction positive apart from malaria in kala-azar typhus fever and typhoid fever. Doubtful reactions occurred in syphilitics and in recruits undergoing prophylactic inoculations.

W F

TRENZ (F.) *Etudes expérimentales sur le rôle des euglobulines dans le mécanisme de la mélano-flocculation de Henry. [Euglobulins in Henry's Reaction.]*—*Arch Inst Pasteur d'Algérie* 1935 Dec. Vol. 13 No. 4 pp 513-565 [63 refs]

The author describes a series of experiments which he has carried out and from which he concludes that Henry's reaction is due to qualitative changes in the euglobulin of the serum.

The serum-albumen and serum-globulin are increased in the experimental trypanosomiasis of rabbits. The globulins are not only increased but they become unbalanced, and their instability is shown by an increase in the euglobulins. Melano-flocculation becomes positive as the euglobulins increase and as the rabbits improve under treatment the instability of the serum disappears. CHORINE and GILLIER obtained positive reactions in normal serums to which normal euglobulin had been added. This experiment was repeated by the author who states that the flocculation thus obtained is not a true flocculation but has only the character of the surflocculation which occurs with distilled water. Normal euglobulin has much less affinity for melanin than the altered euglobulin which is present in malaria. Melanin becomes fixed to this special euglobulin and precipitates it.

The author obtained a characteristic positive reaction in 0.9 per cent saline to which euglobulin from a case of malaria had been added. The reaction was not given by the other constituents of the serum. When the lipoid fraction of the euglobulin was removed by acetone the euglobulin was no longer precipitated by melanin. The abnormal structure of the euglobulins in malaria is probably imparted to them by the cells in certain parts of the reticulo-endothelial system. Melano-flocculation is not produced by the distilled water for one can obtain it in undiluted serum. Distilled water is a bad medium for the melano-reaction because it precipitates in addition to the euglobulins lipoid and protein fractions which play no part in the true Henry's reaction.

W F

CACULESCO (M.) & HIRSCH (R.) *Sur la valeur diagnostique du pigment paludéen. Les épreuves de sa concentration dans le sang et dans les urines.*—*Bull Acad Med Roumaine* Bucharest. 1936 1st Year Vol. 1 No. 1 pp 31-34 [10 refs]

DALEAS (Pierre) & LAVERGNE (Jean) *Contribution à l'étude du paludisme congénital par la pratique systématique de la réaction de Henry et l'étude des formules leucocytaires chez les accouchées et leurs nouveau-nés.* [Congenital Malaria and Henry's Reaction.]—*Bull Acad Med* 1936 Feb 25 100th Year 3rd Ser Vol. 115 No. 8 pp 345-354

Parasites were found in 3 cases out of 887 both in the mother and in the umbilical cord of the infant. In 10 cases parasites were found in

BENHAMOU (Ed.) & GRUZ (R.) Les facteurs chimiques de la malarié fibuleuse (réaction de Henry) dans le paludisme soudanais [The Chemical Factors of Henry's Reaction]—C. R. Soc. B 1935 Vol. 120 No. 40 pp 1259-1261

Analysis of the serum in malaria shows an increase of euglobulin & a decrease of serum-albumen and cholesterol. Henry's reaction is dependent upon the quantitative relation of these three substances to one another. The authors express this relation as a fraction euglobulin

which they term the "index of floccability" serum albumen \times cholesterol. In normal blood this equals from 0.01 to 0.05 and Henry's reaction is negative when it is above 0.1 Henry's reaction becomes positive. For example, the index in a case of benign tertian malaria was euglobulin 4.5 serum albumen 23 \times cholesterol 0.73 = 0.26 and Henry's reaction was positive. After treatment with quinine the index was euglobulin 3 serum albumen 49 \times cholesterol 1.5 = 0.04 and Henry's reaction was negative.

H.F.

VILLAIN (G.) & DUPROUX (R.) Contribution à l'étude sérologique du paludisme. (Première note.) Préparation d'une substance artificielle (M. A.) et principe de son application à la réaction suisse de Henry [Henry's Reaction. Preparation of an Artificial Melanin (M.A.)]—Bull. Soc. Path. Exot. 1935 Dec. 11 Vol. 28 No. 10 pp. 913-921

Introduce successively into a dry flask —

Tyrosine Pouletée	"	"	0.30 gm.
Perchlorate de fer (sulfat officinalis)	"	"	0.45 cc.
Eau oxygénée 12 vol	"	"	1
Eau distillée	"	"	1

Plug with cotton and shake. Leave for 15 minutes the boil and boil quietly for 1 minute. Pour the hot liquid flask containing 100 cc. of boiled distilled water which is quietly for 3 minutes.

Cool the flask rapidly under the tap.

After 30 minutes add 3.20 cc. of N/1 caustic soda. Leave for 12 hours at the temperature of the laboratory through a moistened paper.

The dark brown filtrate is the M.A.

It behaves in almost exactly the same way as Henry's

VILLAIN (G.) & DUPROUX (R.) Contribution à l'étude du paludisme. (Deuxième note.) Technique de la fixation. (Troisième note.) Résultats obtenus dans la M.A. flocculation et conclusions. [The Serological Test with Artificial Melanin]—Bull. Soc. Path. Exot. Feb. 12 Vol. 29 No. 2 pp. 121-124 124-130

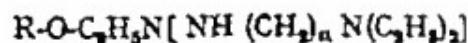
The authors describe the technique of their modification reaction with the use of an artificial melanin which they (see above). They conclude that the results with M.A. and Henry's ox melanin are approximately the same they are

Many interesting observations are collected and we learn that Robert Koch a protagonist of quinine prophylaxis did not himself practise it in Africa. As an illustration of the difficulty of getting quinine really taken, Ruge cited merchant ships where quinine was served out with rum the rum was swallowed the quinine went overboard. Many accounts of the use of quinine for prophylaxis are rendered worthless by the doubt whether the drug was really taken and absorbed.

A sufficient account is given of the introduction and early work on the use of plasmoquine and atebrin here Germany takes the lead by right. Those who read German will find a great number of observations on the use of quinine collected here but how far these are comparable remains uncertain the snags are numerous. A G Bagshawe

HENRY (T. A.) The Chemotherapy of Malaria—Reprinted from *Jl Soc Chem Indust* 1936 May 1 Vol. 55 No 18 pp 111T-117T [31 refs.]

This is a review devoted to the correlation of antimalarial action as measured in bird malaria with variation in chemical structure in the three principal types of antimalarial drugs *viz* the cinchona alkaloids plasmoquine and atebrin. It is shown that quantitative expressions for antimalarial action are not always strictly comparable owing to variations in technique difference in standards and variations in the birds used, but in spite of these difficulties, a surprising amount of agreement is to be found in the assessment by different observers of antimalarial value throughout the same or similar series of compounds. Thus both the French (Fourneau *et al.*) and the Russian (Magidson *et al.*) teams of workers are agreed as to the dystherapeutic effect of increasing the weight of the alkoxy-group ($R-O$) in position 6 of compounds of the plasmoquine type which may be represented by the condensed general formula*



They are also agreed as to the curious alternating effect of increasing the value of n in the basic side-chain of these compounds. The activity increases to a maximum with increase in the value of n up to $n=9$ after which it falls off but the peaks at the odd numbers $n=3, 5, 7$ are higher than those at the even numbers $n=2, 4, 6$. Less work has been published regarding the acridine series of antimalarials to which atebrin belongs and which may be represented by the general formula $R-O-C_n\text{H}_5\text{NCI}[\text{NH}-(\text{CH}_2)_n\text{N}(\text{C}_6\text{H}_5)_2]$. In this set antimalarial activity increases with rise in the value of n up to $n=4$ and then diminishes which is the normal behaviour of items in a homologous series.

In the cinchona alkaloid group the most interesting points dealt with are the inhibition of anti malarial activity (a) by the formation of an ether-oxide link between the central -CHOH group and the - $C_6\text{H}_5$ side chain as in β -isooquinidine (see formula 2 below) and (b) by optical inversion at the -CHOH group as in *epiquinidine*. Thus taking quinidine as a starting point and using Qn and Qdn to represent the quinoline and quinuclidine halves respectively of the molecule the following remarkable changes in antimalarial activity result from the

Complete diagrammatic formulae for this and other types of drugs referred to have been given already [this Bulletin 1935 Vol. 32 p. 385].

slight chemical and physical changes (direction of optical rotation at -CHOH shown in []) indicated.

1. Quinidine. $\text{CH}_3\text{O}-\text{Qn}-\text{CHOH}-\text{Qdn}-\text{CH}=\text{CH}_2$, [CHOH, +] Active
2. β -isoQuinidine. $\text{CH}_3\text{O}-\text{Qn}-\text{CHO}-\text{Qdn}-\overset{\square}{\text{CH}}-\text{CH}-\text{CH}_2$, [CHOH, +] Inactive
3. α Quinidine $\text{CH}_3\text{O}-\text{Qn}-\text{CHOH}-\text{Qdn}-\text{CH}=\text{CH}_2$, [CHOH, -] Inactive

It is however not merely negative optical rotation at the -CHOH group which determines antimalarial action because quinine the most active of all the cinchona alkaloids is levorotatory at that point, and a consideration of all the results indicates that although a particular type of structure may appear to be associated with specific action, it is the combination of chemical and physical properties determined by the structure which is effective and any change in that structure producing an alteration in chemical or physical properties or both, may well inhibit antimalarial action.

T. A. Hogg

Rosa (Alberto) & VALLI (Enea Suzzo) L'atebrin e la plasmochina nella bonifica umana antimalaria. (Atebrin and Plasmoquine as Malaria Prophylactics.)—Riv. d. Veterinaria, Ser. I, 1936, Vol. 15, No. 1, pp. 32-59. With 3 figs. ("maps"). Free summary.

The term "human bonification" here signifies intensive treatment of persons before the usual annual outbreak of malaria in two highly malarious zones of Basso Ferrarese—S. Giuseppe and Gorino. The author describes the geographical position, the economic condition, and the malaria prevalence of these places. In S. Giuseppe of 1,629 inhabitants the splenic index was 28.4 and the malaria incidence 38.4 per cent. In Gorino among 83 children examined the splenic index was 21.6. The general plan of treatment was to give atebrin daily for 5 days and then, after an interval of 3-6 days, 3 days course of plasmoquine—atebrin 0.1 gm. and plasmoquine 0.01 gm. per tablet. The dosage was one tablet up to 4 years, two for those between 4 and 5, for those over this 3 tablets. During the summer quinoplasmoquine was given, 10 days drug, repeated after a 10-day interval, in dosage of 0.01 gm. sulphate of quinine and 0.03 gm. plasmoquine for 3 days and 0.6 gm. and 0.02 gm. respectively for the other 7 days, for adults. The incidence of malaria was considerably below that of the previous year. In S. Giuseppe from 30.1 in 1933 to 5.1 in 1934 and in Gorino with 500 inhabitants from 30.9 to 18.7 per cent. (In another place the last figure is given as 17.8)

H. H. S.

KROBER (Friedrich) Erfahrungen mit Atebrin, per os zur Prophylaxe, per injectionem zur Behandlung der Malaria. (Atebrin by Mouth for Prophylaxis and by Injection for the Treatment of Malaria.)—Arch. f. Schiffs- u. Trop. Hyg. 1936, Mar. Vol. 40 No. 3, pp. 119-123.

Experiences with atebrin in Tanganyika Territory in prophylaxis and treatment of malaria.

The observations were made during the fever season which corresponds with the rainy season, and during this period fresh infections are always occurring. The prophylaxis was undertaken in natives amongst whom adequate control observations could be carried out. Sixteen adults and 14 children were given atebrin as a prophylactic. The author's scheme was to give one tablet 0·1 gram atebrin on Monday, Wednesday, Thursday and Saturday for six weeks as this is the maximum period for the rainy season. Children received smaller doses 0·05 gram half a tablet 1-6 times weekly according to age. Without exception the adults and children remained free from fever and fit for work whilst many of the controls had fresh infections with parasites in the blood. After cessation of the atebrin the controlled observations were continued for 4 weeks longer and it was found that of those who had taken atebrin only one person a 12 year old boy developed fever with rings of malignant tertian in his blood all the rest remained well. Following this satisfactory result the author advised all Europeans who lived in malarial districts to adopt this prophylaxis and reports received are satisfactory.

For the treatment of severe malaria he has found the new preparation atebrin musonate very useful. He prefers the dry powder to the prepared solution. Each ampoule contains 0·1 gram and this is dissolved in 3 cc. distilled water and given intramuscularly in more urgent cases intravenously injected very slowly. Later he gave 0·2 gram in 5 to 6 cc. water. For small children the dose was 0·03 to 0·05 gram intramuscularly. For children of 10 and over 0·06 to 0·1 gram per dose. It was well tolerated. He considers that the injections are valuable in severe cases of malaria with loss of consciousness and intestinal disturbances which interfere with oral administration. He follows up the injections with oral administration of atebrin and plasmoquine simplex.

E D II Gray

VOORHOEVE (H. C.) Een nieuwe vorm van chininetoeidiening bij malaria. [A New Form of Quinine Administration in Malaria.]—*Geneesk Tijdschr v Nederl Indië* 1936 June 9 Vol. 76 No. 23. pp 1441-1449 [10 refs.] English summary.

Six years ago TABOLOFF in order to counteract the tendency of quinine to bring about a leucopenia suggested the quinine being given intramuscularly with glycerol iodine and adrenalin. The author first compared the results as regards the white cell counts of giving the new mixture to 10 persons and of giving injections of quinine to 10 and using another 10 as controls. He did not find the first presented any increase in leucocytes. He then carried out a larger series of tests to 37 persons with tertian malaria were given quinine tablets to 70 quinine bishydrochloride in solution to 120 quinine in ampoules 12 were treated with aristoquine 52 with quinoplasmine and 57 with the iodine quinine. In a table the results are given divided into 3 groups (1) those in whom the temperature fell by crisis (2) those with lytic fall and (3) those with an irregular temperature curve. In 34·4 per cent. (11 persons) of the quinine tablet group in 28·6 per cent. of those having the solution and in 40·4 per cent. of the quinoplasmine group the temperature fell by crisis. In 56·2 per cent. of the quinine mixture group. Not only was this better result observed on the fever but also in disappearance of plasmodia with this drug. Two cases with splenic

enlargement not reduced by other methods showed considerable reduction with the iodine quinine mixture. The mode of preparation of this mixture is as follows --

4 gm. bishydrochloride of quinines are dissolved by aid of heat in 3 cc. distilled water next, 0.2 gm. iodine is dissolved in 21 cc. glycerin, and the two solutions mixed, filtered while warm and sterilized by heating in a water-bath for 15 minutes and 1 cc. of 1/1,000 solution of adrenalin hydrochloride added. The author says that he has not confirmed the statement that after 12 hours a precipitate settles down and that it is advisable therefore to heat the mixture to the body temperature before injecting it.

H H S.

HUAN (M.) On the Alleviation of the Toxic Symptoms of Quinine.—*Taiwan Igaku Zasshi* (Jl. Med. Assoc. Formosa) 1936 Jan Vol. 35 No. 1 (370) [In Japanese pp. 198-204 English summary p. 203.]

This is an account of experimental work carried out on white mice to show the effect of stimulation of the sericulo-endothelial system in combating the ill-effects of quinine. The author found that quinine given in a dose of 0.03 cc. of a 0.7 per cent solution per gm. bodyweight caused death in a little over 5 days, average 5.3. If at the same time the same dose of 0.5 per cent egg-albumen was injected, death did not take place till 20.7 days with the same dose of double strength albumen (1.0 per cent) death occurred a little earlier average 20.0 days. Stimulation by exposure to ultra-violet rays, though prolonging the interval, was not so effectual as the egg-albumen. Thus after exposure to the rays for 6 days the quinine was injected, and the animal exposed to the rays at a distance of 50 cm. for 20 minutes twice daily death occurred after an average of 15 days.

H H S.

SANDERS (J. P.) Treatment of Malaria with a Short Course of Quinidine.—*Jnl. Trop. Med.* 1935 Nov Vol. 15 No. 8 pp. 651-660

Plantation negroes treated successfully with 4 or 5 day course of quinidine consisting of 40 to 70 grains in all.

From 1930 to 1933 the author employed quinidine or quinine in 10 grain doses once a day for 4 days. Quinine stopped the fever in about 4 days, quinidine in about 2. Malaria became more prevalent and severe after a flood in 1933 and from then onwards the treatment was altered to a five-day course of quinidine 20 grains on each of the first 2 days and 10 grains on each of the other three. A total of 1,047 cases in 884 individuals was treated during the 5 years 1930 to 1934 by the short course of quinidine 420 benign tertian, 243 subtertian, 384 no parasites found. The patient was practically always well in less than a week and back at work, a result most satisfying to patient, physician and plantation owner. The quinidine was purchased in 5 grain capsules and the average cost per patient was apparently about 25 cents per annum. This work was done near Shreveport, Louisiana, and most of the patients were plantation negroes. [Presumably they were a relatively immune population and responded readily to treatment.]

H F.

BARBOZA (Amando) La quinina y la asociación quinina plasmoquina en la prevención de las recidivas de tercera benigna (Estudio comparativo)—Reprinted from *Africa Médica* 1936 No 8 15 pp With 2 graphs

SÖHNENSCHREIB (C) Schädigung durch Plasmochin Überdosierung [Damage from Overdosing with Plasmoquine.]—*Arch f Schiffs u Trop Hyg* 1936 Apr Vol 40 No 4 pp 165-168

A case is described which presented the typical picture of plasmoquine poisoning of average severity and this was ascribed to relative over dosing and to the simultaneous administration of plasmoquine and atebrin. The patient weighed only 48 kgm. and had suffered from several malarial relapses flagellate colitis and anaemia. In 5 days she had taken as well as atebrin 15 tablets of plasmoquine each 0.01 gm. and in addition 0.06 gm. plasmoquine was given by injection. In all 0.21 gm. plasmoquine within four and a half days. The author warns against the simultaneous administration of plasmoquine and atebrin

E D II Greig

DECOURT (P) Etudes sur la toxicité de la praequine (plasmochine) et de la rhodoquine (710) (Deuxième note) [The Toxicity of Praequine (Plasmoquine) and Rhodoquine (710)]—*Bull Soc Path Exot* 1936 Mar 11 Vol 29 No 3 pp 328-336

The two drugs given together exert a combined therapeutic action but not a combined toxic action

These drugs are not equally toxic for all laboratory animals but generally speaking praequine is twice as toxic for them as rhodoquine. In man they are of equal toxicity. The sign of intolerance of praequine is cyanosis with the formation of methaemoglobin it attacks the blood corpuscles and the myocardium both of which are of mesodermic origin. Rhodoquine in big doses does not produce cyanosis it attacks the nerve cells which are of ectodermic origin and it causes vertigo and palsies. It is often convenient to give a gametocidal drug at the same time as atebrin or quinine is given, though it is safer to give it as a separate course of treatment. For example 0.3 gram atebrin with 0.03 gram plasmoquine daily for 5 days was followed by toxic symptoms in several cases. It occurred to the author that as praequine and rhodoquine had entirely different toxic actions it was probable that if they were given together they would in no way help one another to poison the patient. He carried out many experiments on animals which confirmed his hypothesis that when two drugs exert their toxic action on systems of different embryological origin, they do not associate their toxicity when they are given together. For example when a dose of x grams of praequine was given to mice 55 per cent. died, and when y grams of rhodoquine were given 40 per cent. died. When, however x grams of praequine and y grams of rhodoquine were given together not 55+40 per cent. but only 55 per cent. of the mice died. He next tried the mixture on man and found that it acted in the same way. The gametocidal therapeutic action was the sum of that of each of the drugs but the toxic action was not. He recommends that these two drugs should be given together in equal quantities for 3 days and that the daily dose of the mixture should never exceed 0.03 gram. This treatment has been extensively employed for the last 2 years without causing any toxic symptoms.

W F

HOORS (A. L.) *The Advantages of Atebrin in the Treatment of Malaria amongst Controlled Labour Forces in Malaya.*—*Trans. Roy Soc. Trop. Med. & Hyg.* 1935 Nov 25 Vol. 29 No. 3 pp 18-259 [38 refs.]

Atebrin is the best drug available for the controlled treatment of all types of malaria in Malaya."

The labour forces in question number some 20,000. The atebrin treatment consisted of 0.3 gram daily for a period of 5 days. If the temperature was above 99°F on the third or fourth days, the treatment was continued for one or for two days longer. In subtertian cases and in some relapsing cases of benign tertian, the atebrin was followed by a five-day course of plasmoquine 0.01 gram three times a day. This was the treatment for adults and for children over 10. Smaller doses were given to younger children but those under 6 were not given plasmoquine without special orders. The quiniole treatment which was formerly employed consisted of 30 grains a day for the first week or ten days and 10 grains a day for 3 weeks. Atebrin treatment actually costs less, and there is a still greater saving effected by the low relapse rate lessened absence from work and greater efficiency. Atebrin is not a substitute for antimalarial measures such as drainage and culicid control but it is a great adjunct to them.

Atebrin has been in use on the Malacca Estates since the middle of 1932, and since then the numbers of deaths and the numbers of patients admitted to hospital have been less than in any year since they were first recorded in 1925. This improvement the author attributes partly but not entirely to the use of atebrin. No case of blackwater fever has occurred since the middle of 1932. The relapse rate has been very low. In 600 cases, observed for at least 8 months after treatment, it was about 15 per cent. In benign tertian, and 7 per cent. in subtertian.

It is to be borne in mind that some of the further attacks of malaria must have been new infections though all are counted as relapses. There were very few toxic symptoms. In 1,207 cases there was only one case of cerebral excitement—this was a male Tamil in whom the condition developed on the 4th day of treatment and passed off in 3 days. Severe headache occurred in a few patients. Violent vomiting was rarer than with quinine. Severe colic occurred in 9 patients, 7 of whom were taking plasmoquine. The author states that he is not in agreement with those workers who prefer to allow the patient to pass through several attacks of malaria controlled by small doses of quinine, with the object of producing immunity. He argues that this must produce a number of reservoirs for the spread of infection and he writes, "we shall at preventing the reinfection of the cured sufferer from malaria and we therefore do not take the risk to himself and others of trying to produce a possible immunity." With this object he has employed atebrin instead of quinine since the middle of 1932, on all the estates of the Malacca Agricultural Medical Board. (See HOORS, this Bulletin 1933, Vol. 30 pp. 478 and 843; 1934 Vol. 31 pp. 678 and 685.)

SECKINGER (Daniel L.) *Atabrine and Plasmoquin in the Treatment and Control of Malaria.*—*Amer. Jl. Trop. Med.* 1935 Nov Vol. 15 No. 6 pp. 631-649 With 2 figs. [21 refs.]

In rural malaria where drainage is impracticable, atebrin and plasmoquine are of great value in a country where there is a definite malaria season.

This study was made in an area of Calhoun County, Georgia where drainage would be very difficult because of the numerous lime-sinks. The area is entirely rural—it is 54 miles square with a population of 1,325 most of whom are negroes. The parasite index of the school children in the autumn of 1932 was 80 per cent. Two adjacent areas were selected one for treatment and one as a control. The treatment was as follows—plasmoquine 0.01 gram three times a week was given to everyone in the treated area and whenever anyone had malaria he and all his household received a five-day course of 0.3 gram atebrin daily. This treatment was carried out in the malaria season, which lasts from May until the end of October during the years 1933 and 1934. The result was a very material reduction in infection—at the beginning of treatment in 1933 24.7 per cent were infected—at the height of the malaria season in October only 10.9 per cent. The corresponding figures in the control area were 29.3 in May and 60.3 in October. The crescent rate in October was 21 per cent in the treated area and 36 per cent in the untreated. The results in 1934 were equally good, but were complicated by treatment of the control group during October. [There is also the complication of a misprint in the tables.] The percentage of those originally negative who subsequently became positive was 27.8 in the treated area as compared with 69.0 in the control area. KOUP and CLARK who attempted the control of malaria with drugs in isolated villages in Panama did not meet with success [This Bulletin 1935 Vol 32 p 784]. The author discusses the reasons for the different results. (1) In Panama mosquitoes and malaria are present throughout the year but in Georgia there is a definite malaria season followed by a period of 6 months during which there is little or no transmission. (2) The Panama experiment was made in villages where an infected mosquito may easily infect a large number of people but the author's investigations were made in a very sparsely populated rural area.

W F

HAY (D C) SPAAR (A E) & LUDOVICI (H L) Atebrin Treatment in Malaria.—*Indian Med Gaz* 1935 Dec. Vol 70 No 12 pp 678-679

No abscess resulted in 3,500 cases treated with injections. Mental disturbance occurred in about 5 cases per 1,000.

The authors have treated 3,500 patients in their private practice with two injections of either atebrin dihydrochloride or atebrin musonate. In each case the injections were followed by a six-day course of two 0.1 gram tablets of atebrin daily by the mouth. Each of the two injections consisted of 0.15 gram of the dihydrochloride or its equivalent in musonate bringing the total quantity up to 1.5 grams of atebrin for an average adult. The therapeutic results were excellent. There was not a single case of collapse after injection nor any death attributable to the drug. No abscesses occurred in the whole series and pain at the site of injection was negligible. Cases of mental excitability occurred in about 5 cases per thousand and occasionally patients complained of headache, restlessness and insomnia. Toxic symptoms on the whole were rare—one patient confessed after an injection of the dihydrochloride that he had already swallowed 10 tablets on that day but no ill-effects followed and the man was back at work within 24 hours. Mental symptoms when they occurred were readily controlled by sedatives.

W F

- I. UDALAGAMA (Lyn) Mental Derangement in Malaria Cases treated by Atebrin-Musionate Injections.—*Indian Med G.* 1938. Dec. Vol 70 No. 12 pp 679-683
- II. INDIAN MEDICAL GAZETTE 1935 Dec. Vol. 70 No. 12 pp 687-688.—Malaria, Atebrin and Mental Disturbances.

I. Details of 7 cases.

The standard treatment with atebrin musionate was two injections, each equivalent to 0.3 gram of atebrin with an interval of 24 hours between the injections. [This is double the dose given by HAY and his colleagues see above] Mental symptoms appeared in 7 out of 64 cases treated as out-patients at the Yanamalai Field Centre Ceylon. All the patients were examined as to fitness for treatment and they were given food before and after the administration of the injections. The following is a short abstract of the details of the 7 cases given by the author

Onset.	Duration	Symptoms
1 2 hours after 2nd injection ..	17 hours	Absent, restless and violent. Memory a blank for this period
2 3½ hours after 2nd injection	36 hours	Severe headache, talking incoherently restless
3 1 hour after 2nd injection	217 days	Dazed and indifferent to surroundings. Tracing symptoms after 4 days
4 2½ days after 2nd injection	42 days	Gradual onset, made mistakes in writing out the charms by which he made his living. Later became violent, threatened to kill wife and was removed by police. Memory a blank for period of mental disorder
5 1½ hours after 2nd injection	not yet recovered	Irritable, alert, and melancholic
6 7 12 hours after 2nd injection	died	Dazed
7 1½ hours after 2nd injection	8 days	Violent and absent

II. The dangers of atebrin have been exaggerated.

The writer of this leading article considers that the effect of atebrin in producing mental disturbance has been exaggerated. These effects have been attributed to atebrin per se and a false impression has been created. However the evidence that we now have before us does seem to indicate that there is some aetiological connection between these mental disturbances and the administration of atebrin in a malarial subject. He points out that the symptoms in cases 6 and 7 of Dr Udalagama's series were probably not due to atebrin, and that therefore the incidence of mental symptoms was about one in every hundred cases treated. Dr HAY and his colleagues (see above) used doses only half as large they saw only half as many cases of mental

disturbance, and such as occurred were mild, of short duration and easily controlled by sedatives.

W F

FOR (Henry) KONDI (Athena) & PARISTERIS (Michael) Studies on Atebrin. A Controlled Field Experiment to test the Relapse Value of Atebrin.—*Trans Roy Soc Trop Med & Hyg* 1938 June 30 Vol. 30 No 1 pp 109-114

The object of the observations described in this paper was to determine the malaria parasitic relapse rate after treatment with atebrin. The inquiry was carried out in the village of Samsus about 38 miles inland from the western coast of Epirus (Greece). In January 1933 when the work was begun the spleen rate of the village was 92 per cent and the parasite rate 99 per cent. (*P. ovale* 68 per cent, *P. falciparum* 20 per cent, *P. malariae* 4 per cent mixed 7 per cent.) In the previous August the parasite rate had been 58 per cent. The season of active malaria transmission in Greece is from June to October the observations were thus carried out at a period when new infections were at their lowest or non-existent.

Two hundred villagers were selected at random, avoiding however children under five years of age. The blood of each was examined on three successive days, on the last of which treatment was begun. For treatment these villagers were divided into four groups. To each member of the first group atebrin was given 0.2 gram a day for five days to children, 0.3 gram a day for five days to adults.

The members of the second group received quinine and plasmoquine each day for five days as follows —

ages 5 to 10	0.8 gm. quinine	+ 0.01 gm. plasmoquine
10 to 15	1.5	+ 0.01
above 15	2.0	+ 0.02

The members of the third group received quinine alone for five days as follows —

ages 5-10 0.8 gm. quinine 11-15 1.5 gm. above 15 2.0 gm.

The fourth group was the control group to each member of which bicarbonate of soda was given.

The blood of all persons under observation was re-examined on three occasions during the first week of May and the percentage of those harbouring demonstrable parasites is the relapse rate of the authors. In the atebrin group this relapse rate was 12 per cent in the quinine and plasmoquine group 17.5 per cent. in the quinine group 27 per cent. in the control group the May infection rate was 38 per cent.

[In estimating the parasite relapse rate no account is taken of the infection rates in the various groups at the beginning of the observations. In the atebrin group the infection rate fell from 47 to 12 per cent. in the quinine and plasmoquine group from 32.5 to 17.5 per cent. in the quinine group from 33.3 to 27 per cent. and in the control group from 42 to 38 per cent.]

Norman White

CARMAN (J. A.) & CORMACK (R. P.) A Controlled Experiment in the Treatment of Malaria and Atebrin-Musonate by Injection.—*Trans Roy Soc Trop Med & Hyg* 1938 Jan 25 Vol 29 No 4 pp 381-396 With 1 chart.

The results of 3 injections were similar to those of a five-day course of oral atebrin. Symptoms were relieved as readily as by quinine injections and convalescence was shorter

Thirty three cases of malignant tertian were treated with atebri masonate injections and 33 were treated with quinine and plasmoquine. The temperature came down, the asexual parasites disappeared and the short duration of the treatment was a great advantage. There were no toxic symptoms. The authors are of the opinion that the number of relapses was much less than it would have been after quinine. A drawback was the expense. 15 tablets of atebri costs two shillings, one ounce of quinine costs the same but one ampoule of atebri costs half-a-crown. The authors recommend the intramuscular injection of one 0.375 gram ampoule daily for 3 days. The high cost makes it unsuitable for native hospitals, "but the slight inconvenience involved and lack of all unpleasant toxic symptoms make it a strong rival to quinine and oral aebri for patients able to bear the expense." H F

BROWN (A Forbes) Initial Impressions of Atebri-Plasmoquin in the Treatment of Malaria in Uganda.—*Jl. Trop. Med. & Hyg.* 1938, Dec. 16, Vol. 38, No. 24, pp. 301-304 With 10 charts.

Atebri is a better remedy than quinine.

The author's impression after treating 200 cases with atebri, and plasmoquine is that further experience will probably bring him to the conclusion that quinine should be discarded in favour of "the shorter, less unpleasant and, to my mind, more efficacious remedy." The treatment given was atebri 0.1 gram and plasmoquine 0.01 gms three times a day for 5 days. No toxic symptoms were noted. The author states that the retail price of atebri is 4 shillings for the 15 tablets necessary for a 5-day course—"admittedly expensive, but a course of retail quinine say of 30 grains daily for 1 week, would be just as expensive and much more unpleasant." [Probably he does not mean to imply that quinine costs more than 8 shillings an ounce in Uganda but that recovery is so much quicker with atebri treatment.] H F

MANNON (D) Atebri-Plasmoquin in the Treatment of Malaria.—*Indian Med. Gaz.* 1938, Mar. Vol. 71, No. 3, pp. 17-18

Toxic symptoms occurred in several cases treated with 0.3 gm of atebri and 0.015 gram of plasmoquine daily for 5 days. In every case there was some abnormality of the gastric juice, either too much or too little hydrochloric acid.

These experiments were carried out in the central hospital of a group of tea gardens in Assam. The patients remained in hospital for at least a week and they were seen once a week afterwards for a period of 6 months. Twenty-one of the patients were treated with atebri 0.1 gram t.d.s. and 50 were treated with the same dose of atebri, together with plasmoquine, either 0.0033 or 0.005 gram with each dose, the small difference in quantity made no apparent difference. Treatment in both groups lasted five days. The fever and the parasites disappeared rather more quickly in the plasmoquine group, but the numbers are small. Six cases are recorded in which toxic symptoms occurred in the plasmoquine group. In two cases there was hyperchlorhydria, in three cases there was complete achlorhydria, in one there was cholecystitis. The author concludes that "there seems to be a definite connection between achlorhydria, the biliary system, and the

production of toxic symptoms after the exhibition of atebrin and plasmochin. Two of the patients who suffered from toxic symptoms were subsequently given the same drugs in keratin coated dragees without ill effects. The percentage of relapses in these patients treated either with atebrin alone or with atebrin plus plasmoquine was about 11 per cent in 6 months as compared with 40 per cent after quinine treatment.

W F

CHORRA (R N) GUPTA (J C) & SAX (B) A Comparative Study of the Action of Atebrin and Atebrin-Plasmochin Combination on Indian Strains of Malaria.—*Indian Med Ga* 1936 June Vol. 71 No 6 pp 309-313

This report from the Department of Pharmacology of the Calcutta School of Tropical Medicine gives the results of treatment of fifty four cases of malaria in the Carmichael Hospital with atebrin plasmoquine and compares these results with those obtained by the treatment of a previous series of cases with atebrin alone. The preparation used was Bayer Meister Lucius dragees containing 0.1 gm. of atebrin and 0.0033 gm. of plasmoquine. One dragee given three times a day for five consecutive days was the usual dose for an adult. Twenty cases were infected with *P vivax* 19 with *P falciparum* 4 with *P malarias* and 7 were mixed infections. The age and sex of the patients are not given. All patients were kept under observation for at least a fortnight after treatment daily blood examinations being carried out.

The authors conclude that in so far as the disappearance of parasites from the blood is concerned the combination of the two drugs is no more effective than atebrin alone in benign tertian and quartan infections. Practically all *P vivax* had disappeared on the fifth day. In malignant tertian infections however the combination is more effective. On the sixth day 86.5 per cent of the cases so treated showed no parasites whereas in only 55.5 per cent of cases treated with atebrin alone were no parasites found. The relapse rate in all forms of infection is definitely lower if treated with the two drugs combined. Figures on which this conclusion is based are not given. There appeared to be no relationship between the number of parasites in the peripheral blood and the time taken for their disappearance under treatment.

Norman White

GOWINDASWAMY (M V) Atebrin Poisoning. [Correspondence]—*Lancet* 1936 Jan. 4 pp 58-57

A man aged 32 was admitted to the Mysore Government Mental Hospital with symptoms resembling delirium tremens. He was a total abstainer. He shouted that he saw snakes and fantastic animals crawling on the floor and he reacted to these hallucinations with so much fear and violence that it was necessary to restrain him. The pupils were dilated nystagmus was present speech was slow and hesitating there were fine tremors of the tongue and hands. The pulse was rapid and he was deeply jaundiced. His temperature was normal no malaria parasites were found. His mental symptoms cleared up in 3 days and the jaundice in 7 days. During the 8 days before admission he had been given two atebrin pills daily and 3 injections of atebrin musonate.

W F

KERAR (V. D.) Observations on the Absorption and Excretion of Atebrin.—*Records of the Malaria Survey of India*. 1935. Dec. Vol. 5 No. 4 pp. 393-404 With 4 graphs. [26 refs.]

Oral atebrin is rapidly absorbed and can be detected in the urine 15 to 30 minutes after a single dose of 0.3 gram.

Volunteers were given three doses of atebrin by the mouth, with an interval of one or three hours between the doses, and their urine was examined by the method of WARS and GHOSH (this Bulletin, 1935, Vol. 32, p. 749). Monkeys were given injections of atebrin dihydrochloride and their urine was examined in the same way. When a single 0.3 gram dose was given by the mouth, atebrin appeared in the urine within 15 to 30 minutes when it was given in 0.1 gram doses it took about 60 to 90 minutes. The greatest concentration in the urine occurred during the first 24 hours after a single dose of 0.3 gram, but, when the same amount was divided into 3 doses with 3 hours between them, the greatest concentration occurred on the second day. Qualitatively the presence of atebrin could be detected as long as 53 to 60 days. The greater the amount of the urine, the quicker the rate of excretion. Because of the rapid absorption of atebrin given by the mouth, there can be little advantage in giving it in any other way. In severe cases it may be advisable to give 0.3 gram in one dose on the first day of treatment. From 49 to 69 per cent. of the dose of atebrin was excreted in the urine during 16 to 28 days after its administration. The author questions the accuracy of HICKEY's theory which is to the effect that the atebrin is taken up by the duodenum, passed to the liver, and excreted with the bile back into the duodenum. W. F.

KERAR (V. D.) The Influence of Food in the Stomach on the Absorption and Excretion of Atebrin.—*Records of the Malaria Survey of India*. 1935 Dec. Vol. 5 No. 4 pp. 405-411. With 1 fig.

A single dose of 0.3 gram of atebrin was given to volunteers (a) on an empty stomach, or more than 2½ hours after a meal (b) less than 2 hours after a meal. A corresponding dose of atebrin mononate was given in the same way. It was found that when the drug was taken fasting it appeared sooner in the urine and the quantity excreted during the first 24 hours was greater than when it was taken on a full stomach. Atebrin and atebrin mononate given by the mouth appeared in the urine at the same rate, but the total excreted during the first 3 days was greater in the case of atebrin mononate. W. F.

SIXEON'S (A. T. W.) Mass Treatment with Injectable Atebrin.—*J. Am. Med. Gaz.* 1936. Mar. Vol. 71 No. 3 pp. 132-137. With 1 chart.

Good results of mass treatment with injections in (a) hospital staff, (b) isolated village, (c) population of 5,650 in a mill area. Dose scheme. Two deaths followed plasmoquine given after atebrin mononate. Deterioration of solution on keeping. One per cent. of abscesses after inoculation. Ascribed to sepsis.

The staff of Kurunegalle Hospital, Ceylon, numbering 68 persons was inoculated with 0.3 gram of injectable atebrin (0.375 gram mononate) dissolved in 9 cc. of water. The inoculation was repeated on the following day. Before treatment, 36 had parasites in their blood. The patients went on with their duties. The injections were painless.

though in some cases there was subsequent tenderness at the site of inoculation. Two days later the inoculated persons were all free from parasites. There were no relapses or new infections of the staff during the next 5 weeks but in the following week there were six.

All the 250 inhabitants of an isolated village in the Kurunegalle district were given two inoculations. Before the inoculations parasites were present in 40 per cent. A week later 45 were positive and during the next 6 weeks only 7.6 per cent complained of fever.

At the Godak Mills in the Mahratta country of India 5650 persons were treated. Healthy adult males were given 9 cc. of a solution containing 0.3 gram of atebrin in 9 cc. of distilled water. Children were given the following doses of the same solution —

Up to 6 months	0.5 cc	6 to 10 years	4 cc.
½ to 2 years	1.0 cc.	10 to 12	5 cc.
2 to 4	2.0 cc	12 to 15	6 cc.
4 to 6	3.0 cc	15 to 18	7 cc.

Each person was given a second injection on the following day and also 3 tablets of 0.02 gram of plasmoquine with instructions to take one a day. In 4 cases haemoglobinuria occurred after the third plasmoquine tablet had been taken and two of the four patients died. Abscesses occurred at the site of inoculation in 49 patients thus is attributed to sepsis. No toxic symptoms attributable to atebrin were seen beyond a few cases of giddiness and fainting. The solution for the day was made up in the morning and it was noticed that the cases of giddiness occurred in the afternoon several hours after the solution had been made. If patients were inoculated with a solution which had been kept overnight there were still more cases. Subsequently the solution was prepared in small quantities for immediate use and no more cases occurred. The result of the blanket treatment of the mill-hands appears to have been excellent during a period of 7 months there were only 55 relapses. W F

KARIADI Enkelen ervaringen met chinine en atebrin bij de behandeling van chronische malaria in verband met het optreden van zwartwater koorts te Manokwari (Julianastokenhuis) —Gemeesk Tijdschr v Nederl Indië 1938 Apr 7 Vol 76 No 14 pp 860-879
With 14 charts. [13 refs.]

ZIMMERMANN (Hans) Zur modernen Therapie und Prophylaxe der Malaria (speziell mit Atebrin und Plasmochin) —Med Klin. 1938 May 29 Vol 32 No 22 (1641) p 745

BARBOSA (Amando) Un ensayo de profilaxis antipaludica con atebrina y plasmoquina.—Reprinted from Gac Med Espaola 1938 No 114 pp 3-7

DECOURT (Philippe) VILLAIN (Georges) MARINI (Charles) & DUROUX (Robert) Expériences de prophylaxie collective du paludisme par les produits synthétiques effectuées en Tunisie au cours de l'année 1934 [Prophylaxis of Malaria by Synthetic Drugs]—Arch Inst Pasteur de Tunis 1938 Jan. Vol. 25 No 1 pp 154-198
With 1 fig & 1 map

In favour of drug prophylaxis.

The authors used the following drugs separately in a prophylactic experiment Quinacrine (atebrin) 0.4 gram once a week Praequine (146)

(like plasmoquine) 0.03 gram once a week. Rhodoquine in the next doses Quinine 0.4 gram (8 grains) every day. Each group of persons except the quinine group was given a preliminary five-days treatment with quinacrine 0.3 gram daily. The quinine group received 5 days preliminary treatment with quinine. The results of 6 weeks prophylactic treatment were good.

With quinacrine the parasitic index fell from 23 to 0.5 per cent and the gametocyte index from 21 to 5. The results in the quinine group were almost the same, but its daily administration gave rise to considerable difficulties. The results with praequine and rhodoquine were almost the same.

Next some 750 persons were given prophylactic treatment over 1 week with quinacrine and praequine together. There were no accidents. The result in adults was a reduction of the parasitic index from 71 to 2 per cent, while in the control group the figures were 83 and 81.3 per cent.

II F

RACIOT (Ch.) Paludisme au cours de la fièvre typhoïde. Action de la quinacrine. [Malaria in Typhoid Fever. Its treatment with Quinacrine.]—*Rec. U.S. d' Hyg Trop.* 1935. Nov.-Dec. Vol. 27 No. 6. pp. 315-321

Some authorities consider that quinine should not be given to patients suffering from typhoid fever because it might have a bad effect upon a heart already damaged by the disease, and upon a nervous system debilitated by fever. The author gives details of 9 cases of typhoid fever complicated by malaria, in which quinacrine (Friede's atebrin) was given without any ill effects, and he recommends this drug for the treatment of malaria occurring during the course of typhoid fever.

II F

FIELD (J. W.) & NIVEN (J. C.) A Clinical Comparison of Atebrin-Mesonate with Quinine Bihydrochloride. (A Preliminary Report based on the Treatment of 286 Cases of Acute Malaria.)—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1936. Apr. 8. Vol. 29 No. 4 pp. 647-658. With 7 figs.

A method for detecting atebrin in dilute solution is given. Dose of atebrin discussed. Two cases of fits following atebrin. Intramuscular route preferred to intravenous. Atebrin mesonate acts a little more quickly than quinine.

A series of cases was treated with atebrin mesonate (dimethane sulphonate of atebrin) administered either by intramuscular or intravenous injection. For intramuscular injection the contents of one ampoule were dissolved in 2.5 cc. of sterile tap-water. Solution was complete in 3 minutes. One ampoule contains 0.375 gram, which is equivalent to 0.3 gram of atebrin, and in this paper the doses are expressed in terms of the content of atebrin. The most satisfactory dose was found to be two injections of 0.3 gram on successive days. Two doses of 0.1 gram were inefficient and the response to a dose of 0.2 gram was slow. It is unnecessary to give the drug intravenously as traces appear in the urine within ten minutes of an intramuscular inoculation which indicates a rate of absorption quick enough for the treatment of the gravest infection. The manufacturer's recommend that the dose for intramuscular injection should be dissolved in 10 cc.

of water but the authors found that this was rather too bulky and they used 25 cc. without ill effect.

The following technique was employed in examining the urine for atebrin. 10 cc. of urine is made alkaline with a few drops of saturated potassium carbonate, 0.25 cc. of amyl alcohol is added and the tube is well shaken. The atebrin is extracted by the amyl alcohol which forms a layer on the surface. By means of ultra violet light the typical atebrin fluorescence can be obtained in cases where atebrin is present in very high dilutions. Atebrin appears in the urine a few minutes after injection and then slowly disappears over a period of weeks.

Throughout the course of the present enquiry 421 intramuscular or intravenous injections of atebrin musonate were given to 176 adults. In no instance were toxic effects of any significance observed which could definitely be attributed to the drug. But it is stated in a footnote, we have since observed the occurrence in two subsequent cases of epileptiform fits developing shortly after treatment [The Sectional Editor has been informed that the atebrin was given intramuscularly]. Intramuscular injections caused remarkably little pain or tenderness. In a few instances there was some induration for a day or two. *Intravenous injections were usually associated with temporary giddiness and faintness sometimes lasting an hour or more.*

A control series was treated with quinine bishydrochloride administered orally in solution twice a day for 7 days at a dosage calculated according to body weight. In all 286 cases of acute malaria were treated in alternating sequence with either atebrin or quinine. The result of the comparison is stated by the authors as follows:

There was a tendency for trophozoites to disappear from the peripheral blood and for temperatures to fall to normal somewhat earlier among cases treated with atebrin musonate. It was not possible to obtain precise data regarding the permanency of cure. Relapses after atebrin musonate treatment are probably fairly common. Judging from the graphs given in this report, there is very little to choose between the two drugs (especially in tertian) with respect to their action on the parasites and the fever.

W F

MACKAY (R.) Notes on the Cinchona Alkaloids in the Treatment of Malaria.—*East African Med Jl* 1936 Feb Vol 12. No 11 pp. 336-341

MARQUEZ (H.) La moustiquaire en prophylaxie antipaludique Son application à la protection des collectivités en Indochine.—*Bull Soc. Med-Chirurg Indochine* 1935 Nov Vol 13 No 9 pp 1284-1297 With 9 figs [15 refs.]

PARELI (Anopheles) Old and New Remedies in the Treatment of Malaria.—*Bombay Med Jl* 1935 Oct & Nov Vol 4 Nos 10 & 11 pp 157-168 199-210 [15 refs.]

cases. The nervous system was not involved. Relapses and recurrences were a not infrequent feature of the disease.

Hematological findings.—The red cell count varied from 800,000 to 3,700,000 cells per cmm. The haemoglobin percentage ranged from 25 to 40 per cent. (Hellige haemometer). The colour index varied in 7 instances from 1.0 to 1.8 and in 11 from 0.8 to 1.0; in 20 it was below 0.8. The lowest figure reported was 0.55. In severe cases it was practically always high. Had the Haldane scale been adopted a large proportion of cases would have shown a higher colour index, since in 80 per cent. Hellige corresponds to a 100 per cent. Haldane. The reticulocyte count was frequently high and in 34 cases the author points out that the effect of malaria could not be excluded. For the estimation of cell diameters Eve's halometer was used. In 45 patients the average red cell diameter varied from 7.8 to 8.39 microns. The white cell counts generally revealed leucopenia ranging from 3,000 to 5,000 leucocytes per cmm. The serum bilirubin was increased. 23 out of 31 cases gave a positive Fouchet reaction. The indirect van den Berg was positive in 39 cases the readings varying from 2 to 16 units. Only in 2 cases was the reaction negative. 3 gave a very faint delayed positive reaction.

Treatment.—With a few exceptions all the patients suffered from malaria, so that a 10 days course of quinine, gr 10 twice daily was given as a routine in both pregnant and non-pregnant cases. Septic and intercurrent diseases such as ankylostomiasis and syphilis, were also treated. Hydrochloric acid was prescribed for dyspepsia. Fresh, raw or cooked liver or liver extract given by the oral or parenteral route, was utilized. Campalon was injected daily (2 cc.) or large amounts were given at intervals, i.e. 5 cc. every 4 days. In mild or convalescent cases the interval was increased to 6-8 or 10 days. Marmite was given in a dosage of 2 drachms by weight twice daily in water, milk or food. Its action was not quite so prompt as the liver extract injections. Marmite was cheaper but owing to its high salt content required much fluid diluent and in grave cases with impaired gastric function and vomiting it was not well tolerated. The diet adopted was light and nutritious and as soon as possible eggs and milk were included. Bulky carbohydrates were avoided. A reticulocyte reaction was noted about the fifth day following marmite and liver extract therapy. As soon as the uterus was emptied, whether by abortion, miscarriage or delivery at full term, recovery followed at a surprisingly rapid rate in the vast majority of pregnant cases. In most patients it took 3 to 4 weeks after delivery for recovery to ensue.

[The author states that this form of megalocytic anaemia, though similar to tropical megalocytic anaemia of India and Africa, differed in that practically all cases gave a positive indirect van den Berg reaction and in this respect resembled the megalocytic anaemia of pregnancy occurring in temperate climates. Considering however that the effects of malaria could not be excluded in 34 cases of the series, and that "with few exceptions all cases suffered from malaria," this observation loses much of its significance. The problem was also involved by the presence of other intercurrent diseases such as ankylostomiasis (14 per cent.), syphilis (14 per cent.) and sepsis. The incidence of acid secretion in the stomach was not determined nor was it possible for the author under the circumstances of the investigation, to use more accurate and elaborate methods such as the Price-Jones curves or volume index in determining the megalocytic nature of the anaemia, or

to examine the marrow obtained by sternal puncture. Despite its inevitable limitations from a haematological viewpoint the investigation is a valuable contribution and the subject one well worthy of more detailed study.]

N Hamilton Fairley

NAPIER (L. EVERARD) & DAS GUPTA (C. R.) Haematological Studies in Indians. Part V Red Blood Cell Measurements. With Note by K. C. K. E. RAJA.—*Indian Jl Med Res* 1936 Apr Vol. 23 No 4 pp 873-892. With 2 figs. [16 refs]

This article will well repay careful study. The authors discuss without bias the various methods in use for determining red cell measurements—the halometer the method of Price Jones the variations due to the distance of the cells from the centre of the film variations in different parts of the film the packed-cell method of estimating cell volume and a consideration of the normal volume in Indians and in normal Assam tea-garden coolies [*ante p 75*] They maintain that the halometric method is fraught with possible errors so much so as to be of no practical value. The Price Jones method is accurate and therefore valuable but is very laborious. They suggest a means of lessening this but conclude that it is not altogether practical. The packed-cell method of the authors utilizes 0.2 per cent. potassium oxalate as an anti-coagulant and as a result of controls with hirudin or heparin they adopt Wintrobe's procedure of multiplying the cell volume readings by the factor 1.09 and accept his figure of 8.2 per cent. Examination of the cell volume, total red corpuscles and the haemoglobin in grams per 100 cc. of the blood of 30 city-dwelling male Indians in apparent good health and of 34 Assam tea-garden coolies who had recovered from anaemia has shown that the mean corpuscular volume of the former is higher than British and American standards while the mean concentration of Hb is lower among the Assam coolies the cell-volume was low. The authors conclude that the packed-cell method supplies practically all the required information —

The fallacies other than those connected with inaccuracies in the graduation of the tubes are due to the shrinkage of the cells on addition of the anti-coagulant and to the speed of the centrifuge the former can be overcome by using a constant quantity of oxalate and multiplying the reading by a factor and by using the same centrifuge at the same speed for all one's estimations both in normals and in anaemic patients errors due to the latter can be reduced to a minimum. The question of the effect of speed of centrifugalization seems to require further investigation.

H H S

PAI (H. C.) The Polynuclear Count in Health and Disease and its Significance in China.—*Chinese Med Jl* 1936. Feb Supp. No 1 pp 13-20

The following as determined by W E COOKE may be taken as representing the average Arneth count of healthy subjects in Britain I 10 II 25 III 47 IV 16 V 2. It varies of course but speaking generally a percentage over 40 in I and II together was regarded by him as abnormal. The author studied the condition in apparently normal Chinese in Mukden (Manchuria) and found the average standard to be I 28.7 II 43.7 III 25.4 IV 4.0 V 0.2 i.e. I and II together 70.4 In septic affections the shift to the left was much greater than in the case

of British at home. Thus in acute appendicitis, osteomyelitis, acute tonsillitis I and II made up 97-99 per cent. in scarlet fever and uncomplicated measles 100 uncomplicated whooping cough 91 in the two last with broncho-pneumonia 99 and 97-5 per cent. respectively.

The author has found the I and II percentage and changes in it of value in diagnosis and prognosis in the former case particularly where an expected leucocytosis is not present. Thus, he records the case of a man with chills and fever. Widal negative blood culture negative, no plasmodia no physical signs. Leucocytes on two occasions totalled 5,937 and 7,500 with 73-75 per cent. polymorphonuclears. On a third occasion, they totalled 8,600 but an Arnett count gave I and II 99 per cent. Antrum suppuration was found. In prognosis, the value of this percentage is exhibited by two instances. The first a man with pentitonitis the result of perforated inflamed appendix. For nearly a week the figure remained 90-96 and then followed a steady shift to the right 79-73.5 four days later and 62 in another three weeks the patient recovered. The second was a case of streptococcal septicæmia the figures on the first 3 counts at weekly intervals were 99-98, 99, but after that a return movement to the left took place and 9 days later was 100 and soon afterwards death occurred.

Considering the above findings we may say that the healthy Chinese in Mukden shows a marked shift to the left as compared with the British at home. It would appear to be not a racial difference, but rather domesticity as the following indicates, where the Chinese in Britain has a lowered figure, returning to the higher "normal" on return to Mukden.

Nationality	Place	Duration of residence	I	II	III	IV	V	I & II
British	Britain	—	10.0	25.0	47.0	16.0	5	35.4
Chinese	Mukden	Over a year	32.6	41.2	23.0	3.1	6.1	73.1
		Over 10 years	33.5	46.0	25.25	2.25	0.4	79.5
	Britain	Two months after arrival	12.0	30.0	44.0	12.4	1.4	44
	Mukden	One month after return	27.5	46.0	24.0	^ 5	44	35

BASUERJEE from estimations on Indians in Bengal, RUSU and PRIESTLY on Australian children and New Guinea natives, and KENNEDY on natives in Iraq attribute the shift to the left to climatic influence or infections, active or latent. It was found, however, even in subjects in apparent good health, and might be due, at least in part, to environmental factors, high temperature and powerful sunlight. Again, in tropical and subtropical countries the length of life of leucocytes may be shortened, perishing in middle age¹ and thus the one- and two-lobed cells would predominate. Why this is so we do not at present know but some factor must be at work in Mukden which causes the neutrophil leucocytes to leave the circulating blood much sooner than in Britain, so that relatively few older cells are present. Possibly as the author suggests —

¹ The extreme cold in winter heat in summer the strong sun-light, the dusty and dry atmosphere in winter and early spring may in some

way affect the leucocytes and shorten their life, say by rapid passage through the mucous membrane of the upper respiratory tract. In order to determine which of these factors may influence the longevity of the leucocytes counts of normal individuals at different seasons of the year are being made now.

[Altogether an interesting study and opening up an interesting field of research. See also this *Bulletin* ante p 78.] H H S

TSCHERKES (L. A.) LITVACK (J. I.) & KOROVITZKI (L. K.) Sensitivity to Adrenalin in Pellagrins.—*Acta Med Scandinavica* 1936 Vol 87 No 5-6 pp 459-469 [15 refs.]

Attention has been called on several occasions to the similarity existing between the symptoms of pellagra and those of Addison's disease namely the disturbances of pigmentation, alimentary dysfunction, anaemia, hypotension, adynamia and asthenia indicative of dysfunction of the chromaffin system.

The authors have carried out experimental work on man with a view to establishing in what degree such changes are reflected in the person of the reaction of pellagrins to adrenalin. They record here the results in 8 patients. The blood pressure and pulse rate having been ascertained the patient received, fasting 100 gm of sugar dissolved in 300 cc. water and 10-12 minutes later 1 cc of adrenalin (1 in 1000) was injected intramuscularly. Thereafter every 10-15 minutes for an hour the blood pressure, the pulse rate and the state of the pupils were recorded and the sugar content of the urine after 2, 4 and 6 hours. Six of the patients were suffering from acute pellagra and two with a mild form of it. The detailed findings are recorded for each patient, but the results may be summarized as follows. In pronounced cases of the disease there was practically no reaction to the adrenalin, the pulse rate and blood pressure remained almost unchanged, there was no dilatation of the pupils and there was no glycosuria in the time of the experiment up to 6 hours. In cases of average or slight severity the reaction might be small or absent. Yeast was then given and as the symptoms of pellagra cleared so an increase in the patient's sensitivity to adrenalin was seen.

All these facts prove that pellagrins suffer from a distinct decrease of the tonus of the sympathetic nervous system and of the chromaffin system they tally well with those clinical symptoms of Addisonism and histopathological disturbances mentioned. The accumulation of further material is requisite for wider generalizations in which material special attention should be paid to the restoration of sensitivity to adrenalin in proportion to the disappearance of pellagra—a fact which should be borne in mind for the proper interpretation of the pathogenesis of pellagra and for the definition of the effectiveness of therapy. H H S

NOOSTEN (H. H.) & VISSER (J.) Over de vergiftige eigenschappen van den Reunghas (een klinische en experimentele studie van een blaartrekende substantie) [Reunghas Poisoning]—*Geneesk Tijdschr t Nederl Indië* 1936 June Vol. 76, No. 22, pp 1346-1404 With 6 figs & 6 plates [21 refs.] English summary

The sub-title of this article is a clinical and experimental study of a vesicating substance. The researches detailed were undertaken on

account of a patient admitted to the Mission Hospital, Bandar, suffering from extensive dermatitis after contact with the rambutan tree—*Garcia rambiana* Linn.—which grows near water and *Sesuvium heterophyllum* Bl. often found in cemeteries. The latter was the subject of experiment. Milky juice obtained by mashing the fruit or the bark, produced on contact with the shaven skin of guinea-pigs or rabbits local inflammation, sometimes healing in 4 days, at others setting up a dermatitis persisting, with exudation and necrosis, for weeks. Fresh leaves could be eaten with impunity and a watery extract of the fruit and other parts or the vapour from burning the wood were harmless. An extract of the fruit or wood prepared by the Stass-Otto process proved to be very irritant. A drop placed on the shaven skin of guinea-pig, rabbit or monkey caused hyperaemia, inflammation, exudation and necrosis, lasting for 10 days to several weeks. In the eye it caused severe inflammation and ultimate destruction of the organ. Strange to say by mouth, intravenously or subcutaneously no general symptoms resulted. An emulsion obtained by mixing the extract with water was innocuous when applied to the skin, but in ether in a strength of 1 per cent. it caused inflammation and swelling.

In human beings the extract caused, as in animals, local necrotic inflammation sometimes extending widely and involving other parts of the body causing itching and vesication. Possibly these differences are due to varying susceptibility or to allergy. Further study is to be taken in hand [see also this *Bulletin* ante p. 81]. H. H. S.

DIERICK (J. E. A. M.) Myiasis intestinalis.—*Ned. Tijdschr. voor Geneesk.* 1935 Dec. 21 Vol. 79 No. 51 pp. 589-597 With 1 fig. In Dutch. French summary (3 lines)

The case is recorded of a pregnant woman of 26 years, vomiting worms of *Homoloxys castanea*. The author states that he is unable to conjecture how they came there—the woman was cleanly, had no sores, and had not eaten any tainted meat, nor for several days any raw vegetables.

H. H. S.

CORRADETTI (Augusto) Alcune ricerche sull' *Anopheles maculipennis* (Notes on *Anopheles maculipennis* in Italy)—*Riv. di Malattie Sez. L.* 1936 Vol. 15 No. 2 pp. 106-113. With 1 fig. English summary

The author presents notes on several points which he has observed in studying *Anopheles maculipennis* in Italy.

The first note describes what appears to be an abnormality in the structure of the shell of the egg of *Anopheles maculipennis labranchiae*. The author failed to find any difference in larval structure or in biology between normal *labranchiae* and those raised from these eggs; the adults were evidently stenogamous (the word "eurygamous" being used apparently as a misprint).

The other notes refer to points of biology. It is found that adults of *labranchiae* bred from the egg are much more willing to feed in the laboratory than adults of other races and this is irrespective of whether they are given an opportunity of biting man or guinea-pig, about 80 per cent. feeding on either. Adult *stroblianus* fall into an intermediate group 40-60 per cent. of them feeding on either of the above hosts. Under similar circumstances less than 10 per cent. of adult *typicus* and

melanoön take blood. It is interesting to see that under the particular conditions of the experiment no evidence of zoophilism was obtained.

The author then passes on to statistics of the sex ratio in *labranchiae* bred at different times of the year. His figures appear to indicate that there is no change in sex ratio with season, and that the number of males emerging is generally a little less than the number of females the percentage of males in the whole experiment (about 4,000 mosquitoes) being 47.81. One would perhaps have expected that the proportion of males would be a little above 50 per cent. assuming that the sexes were in equal proportions in the egg, for it is shown that the males emerge about a day before the females so that any cause of mortality in the early stages would tend to reduce the proportion of females because they are at risk for a longer period.

P A Buxton

SHUTE (P G) A Study of Laboratory-bred *Anopheles maculipennis* var *atroparvus* with Special Reference to Egg-Laying.—*Ann Trop Med & Parasit* 1936 Apr 8 Vol 30 No 1 pp 11-16

The author presents detailed studies on the biology of the female *Anopheles maculipennis* var *atroparvus* giving particular attention to the number of batches of eggs laid and the length of the insect's life.

The mosquitoes have been bred uninterruptedly in the laboratory at 75°F for about two years. The author's method is to put a number of newly emerged males and females together for 24 hours. The males are then removed and the females fed. As each female shows signs of developing eggs she is isolated until oviposition has occurred. She is then fed and again isolated, it being found that nearly always a single meal of blood is sufficient to produce a batch of eggs. The author has had remarkable success in keeping the insects alive for about half the females lay 4 batches of eggs and a small percentage of females lay 12 to 17 batches one of these exceptional females produced in all about 2,500 eggs over a period of 60 to 80 days. In spite of the fact that the females are given only the one opportunity of pairing the fertility of the eggs remains undiminished to the end of the series of ovipositions. The opinion is expressed that though the experiments were carried out in a very uniform way there are differences in the rate of survival in experiments carried out at different times of year but the figures quoted do not appear to lend much support to this view.

P A B

STAGE (H H) Mosquito-Control Activities in the Pacific Northwest under the CWA Program.—*Jl Econom Entom* 1935 Dec. Vol 28 No 6 pp 1022-1024

The interest of this account lies in the fact that three different types of anti-mosquito measures were needed to deal with the species concerned. In the thickly matted jungles of willow brush along the Columbia and Willamette Rivers in Multnomah and Columbia Counties Oregon and in Skamania and Clark Counties Washington flood-water mosquitoes *Aedes vexans* and *A. aldrichi* occur in hordes in summer their reduction was effected by clearing their breeding grounds of the willow brush by ditching poorly drained areas and dyking against high water. In the salt-water marsh in Tillamook County Oregon *Aedes dorsalis* breeds in numerous pot holes between high tides. Under the CWA (Civil Works Administration) elimination was attained by

connecting the pot-holes by ditches to the main channel, whereby the high tides flushed and drained out the breeding places. The third was carried out on the northern end of Bainbridge Island, in Puget Sound. This is a summer resort within easy distance of Seattle. There are many springs and the rugged nature of the district formed depressions where seepage and rain collected and *Aedes aboriginis* and *A. fitchii* bred abundantly. Pools and seepage were eliminated as far as possible by ditching watercourses to the Sound and where this was impracticable the sites were cleared so that the pools could be oiled without difficulty.

H H S.

ESCOMEL (Edmundo) & CHAVES VELANDO (L. A.) Un nuevo Pitínero parásito de las pestañas del hombre. [New Species of Lice Parasitic on the Eyelashes of Man.]—*Croatica Med.* 1933. Sept. Vol. 52. No. 887 pp. 335-339 With 2 figs.

In 1930 Dr Chaves Velando observed a case of blepharitis, a child of 2 years with lice attached to the eyelashes. He regarded them as *Pthirus pubis* transferred to the new site. In 1934 he saw a case in a man of 35 years with obstinate blepharitis, and found many lice and their eggs attached to the hairs of the upper right eyelid, and since then another child of 2 years has been seen by him. In all there were congestion and oedema of the upper lid and a blackish powder on the lower—the excreta of the lice. The authors present in tabular form the comparisons between *Pthirus pubis* and this which they call *P. cherresi* from which it is seen that the latter is smaller in all dimensions and of a lighter colour.

H H S.

REVIEWS AND NOTICES.

GRUNSKY (Friedrich) Tätigkeit und Ergebnisse der Malaria-Untersuchungsstation in Emden (Ostfriesland) von 1910-1933. Aktenmäßige Darstellung einer 24 jährigen Malariabekämpfung in einem deutschen Marschlande. [Work and Results of the Station for the Investigation of Malaria in Emden (1910-1933)]—Veröff aus dem Gebiete des Marine Sanitätswesens 1936 Heft 27 180 pp With 6 figs. & 1 folding map [58 refs.] [7 Rm]

In this Report a detailed account is given of the activities of the malaria Station in Emden in East Friesland. The district is flat and marshy intersected by numerous ditches dykes and canals and with many ponds and lakes mostly at and below sea level. In the past the area has been liable to frequent flooding but latterly pumps have been installed to prevent this. The district is situated on the eastern side of the estuary of the river Ems which separates it from Holland on the north it is bounded by the North Sea. The urban area of Emden is about 29 square kilometres and the population about 30 000 much of the latter being contained in the suburbs of Transvaal and Port Arthur. The extent of the rural area in which the malaria station works is about 340 square kilometres with a population of about 25 000.

Malaria has been endemic in East Friesland and especially in the Emden district for centuries. In the past there have been many widespread epidemics some of which were very severe. From the year 1880 onward a decided improvement occurred in the prevalence of malaria this took place coincidentally with the partial drainage of the swampy surroundings. In 1908 there were again many cases it became necessary to adopt systematic measures to cope with the disease and the malaria station was opened in March 1910. Since that date there have been several years in which malaria was again very prevalent the worst period was from 1917 to 1920. After that the number of cases fluctuated year by year the highest number occurred in 1926 after which there was a gradual fall reaching a minimum in 1929 and 1932 but there were rises in 1930 1931 and especially in 1933.

The work of the malaria station consists in the methodical search for cases of the disease accurate diagnosis by blood-examination lectures and publication of explanatory and educational pamphlets and other forms of propaganda. At first the station also undertook the treatment of malaria cases with quinine and the patients were visited frequently by some of the staff or by nurses to make sure that the treatment was being carried out properly. As far as possible patients were encouraged to seek treatment from the local doctors though none was refused treatment by the malaria station and the treatment was free. The doctors were asked to notify to the station all cases of malaria that they saw in their practice and every attempt was made to obtain their co-operation. Unfortunately the work of the station was not welcomed by many of these practitioners who were not at all diligent in reporting cases. The chief reason for this aloofness seems to have been resentment of the fact that the station undertook free treatment of persons in whose blood malaria parasites had been found but even when the station discontinued this practice in 1928 and confined its activities to diagnosis mosquito control and other general anti malarial measures the doctors maintained an attitude of some reserve which, however has lessened of late years.

There was also for a long time, a certain amount of apathy and even opposition, to the acceptance of treatment on the part of the inhabitants, and this was not entirely confined to the less educated. Many of the people were in the habit of carrying out their own treatment with quinine which they took in sufficient quantities to stop at least temporarily the attacks of fever but the treatment was not at all systematic nor thorough enough to render them free from infection. It is and still is, impossible to induce most of those who have had an attack of malaria to submit to frequent examination after they have once had the fever or to persuade them to continue the prescribed course of treatment. Naturally it was easier to ensure continuous treatment and adequate examination of the school-children few carriers were found among the children and it seems that the majority of carriers are adults. With one exception (an infant who had quartan fever) all the cases examined had benign tertian fever a few imported cases of malignant tertian were seen, but this form of malaria did not spread.

As a result of the general rise in the prices of commodities after the war treatment with quinine became very expensive and there was some fear that the malaria station would have to be closed. Fortunately this was not found necessary, but its activities were considerably restricted.

Until 1919 only spasmodic and limited attempts were made to deal with the breeding places of mosquitoes the work was hampered by scarcity of labour and financial stringency. A few small swamps were filled up and others treated with oil hibernating mosquitoes in roofs and cellars were destroyed by flame-projectors and insecticide sprays but the work could not be done very thoroughly on account of the expense, and the operations were opposed by many of the people whose houses it was hoped to free from the insects. More progress was made in 1920 and subsequent years but hibernating *Anopheles* mosquitoes were often found in dwelling houses in very large numbers.

Besides *Anopheles maculipennis* *A. bifasciatus* also occurs in East Friesland, but in too small numbers to play any important rôle in the spread of malaria.

Professor E. MACKENZIE has described three races of *A. maculipennis* in Germany which are distinguishable from one another by the markings and colour of the eggs, and some other morphological features of the adults the differences are especially marked by physiological and ecological characters. In large lakes and rivers, the race *maculipennis* is prevalent *typicus* is seldom found with the other two, and only in a few localities, where there is cold spring water. The commonest race, and almost the only one in the Emden district, is *stroblianus*, which is found along the whole seacoast from Emden to Danzig and also inland, where brackish and saline water occurs. In Emden, among 700 specimens, only 30 belonged to the *maculipennis* variety all the others being *stroblianus*. *typicus* was not found at all. Although *stroblianus* is the mosquito concerned with the existence of malaria in Emden, it cannot be considered a particularly dangerous race since it frequents long stretches of the German coast, and also inland places, where no malaria occurs. Indeed it is more zoophilic than anthropophilic, though it is not at all averse to biting human beings. It passes the winter chiefly in cattle sheds and pigsties, where the temperature is sufficiently high to enable the plasmodium to carry on its development and to induce the mosquito to feed occasionally.

In Emden it was found that several cases of malaria usually occurred in the same family it was comparatively rare for a single member to be attacked. No doubt this is due to one or more persons acting as carriers, from whom the other members of the family derive their infection. For the same reason the neighbours often became infected and so small foci of malaria are formed.

During the 23 years dealt with in the report the blood of 170 babies under one year was examined for malaria of these 57 gave positive results the youngest infected infant being 10 weeks old. Although the disease is not common in old people a woman aged 90 and a man aged 99 were found to have malaria.

In 1933 the last year of the period covered by the report the blood of 751 persons was examined malaria parasites were found in 178 of these (23.7 per cent) it is evident therefore that although it is less prevalent than in many former years endemic malaria is very far from being stamped out in the Emden district.

Dr Friedrich GRUNSKY's account of the endemic malaria in Emden invites comparison with the history of malaria in similar districts in England. The conditions in Romney Marsh the Isle of Grain and some other places are not at all unlike those described by him in East Friesland, though the areas concerned are much smaller. On Romney Marsh *Anopheles maculipennis* is extremely plentiful and many suitable breeding places exist in spite of an extensive system of artificial drainage. In the autumn and winter the insects can be found in immense numbers in some of the older cow byres stables pigsties rabbit hutches and similar places that they are not indisposed to bite man is shown by the fact that many people in these districts use mosquito nets. It is impossible to believe that the mosquitoes have no opportunities of becoming carriers of malaria within easy distance of Romney Marsh and the Isle of Grain there are barracks and occasional concentrations of soldiers many of whom have certainly been abroad and of these it is very probable that some are carriers. Moreover endemic malaria does occur in both places though the number of cases is very small. Formerly these districts were notoriously malarious why has malaria practically died out? It is usual to attribute this to such factors as a higher standard of living better housing and improved general sanitation doubtless these are largely responsible for the almost complete extinction of the disease. But there is also another change in the local conditions which is of considerable importance, and which is liable to be overlooked. This is the great improvement that has taken place in the housing of cattle and other animals. The race of *Anopheles maculipennis* that is found on Romney Marsh like that in the Emden district is decidedly zoophilic. If it is desired to find mosquitoes it is of little use to seek for them in the light and airy modern cow sheds provided as these are with free ventilation, drainage, clean whitewashed walls and tiled roofs very few mosquitoes will be found in these. But there still exist on some of the farms, old fashioned dark, damp and stuffy byres and stables in such places Anopheles mosquitoes abound, as the conditions suit them admirably. Dr GRUNSKY refers to the many animals cows, pigs and goats kept in close proximity to the houses of many of the inhabitants of the Emden district and it seems likely that further improvement in the amount of malaria would occur if attention were given to the housing of domestic animals. This would probably have more effect in diminishing the number of mosquitoes than attempts to do away

valuable section is that dealing with incompatibility for it is astounding to those medical men trained some 30 years ago or more to find how little the modern student knows of this subject. Dispensing having to great extent gone out of fashion for the general practitioner he does not realize how nauseating are some of the mixtures he prescribes, and how he inadvertently may prescribe some explosive or poison mixture. The tablet and patent medicine manufacturer has certainly saved the busy practitioner a lot of time and trouble, but at the same time he is largely responsible for the widespread ignorance of dispensing and pharmacology exhibited by the more recently qualified medical man.

Among the new additions it is surprising to find no mention of vessels as haemostatics especially as they have proved their value and the literature during the past year is fairly extensive. Misprints are few we note that *histo-lyticas* is still wrongly spelt. The list of "contractions of phrases used in prescriptions" needs revision does an, one nowadays write *owni biloba* for every two hours, and even Smith & Nephew would be rightly caned for "Ante cibas," "post cibas," "in pilule to divide." The format of the book is much improved by a larger page and clearer type.

H. H. S.

SABADINI (L.) *Les kystes hydatiques de la rate.* [Hydatid Cysts of the Spleen.] Préface du Professeur Costantini.—200 pp. With 82 figs. 1933. Paris Masson & Cie, 120 Boulevard Saint-Germain. [32 francs.]

Hydatid cysts of the spleen are rare, constituting between 2 and 3 per cent. of all hydatids, according to the records of most authors. Nevertheless the spleen comes third in the list of individual organs invaded, though a long way behind the liver which of course heads the list, with some 75 per cent. the lung coming next with 10 per cent. Partly perhaps on account of its rarity partly by reason of its surgical importance, there is a considerable literature dealing with the condition. The bibliography appended to this book names nearly 300 references.

After a few short remarks on the prevalence and history the author describes in a few pages the pathogenicity of primary and secondary involvement of the spleen by hydatid. The chapter on the pathological anatomy which succeeds this is fuller and of much interest and is illustrated by a number of explanatory diagrams mostly from Professor Divi's work. The clinical section, as would be expected, is not a long one for after all there is not much to be said on the clinical aspect. As regards diagnosis, beyond the physical signs, mention is made of Casom's test and complement fixation. Two chapters, the first and rightly so are devoted to treatment and the details of operative procedure this is abundantly and clearly illustrated. Finally there is a chapter of "observations." This consists of brief accounts of patients, some under the author's care others culled from the literature, together with remarks upon certain of the cases.

The monograph summarizes the literature and present knowledge of the subject and should prove a useful work of reference both for the general practising clinician and the surgeon.

H. H. S.

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PELLAGRA AND PELLAGRA LIKE CONDITIONS IN WARM CLIMATES

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Sectional Editor Tropical Diseases Bulletin

SECTION II *

In the section which will follow it is proposed to discuss a number of conditions having many features in common with pellagra which have been the subject of communications some in recent years others many decades ago. To some of these as possible examples of atypical pellagra attention has been called on a previous occasion (H S STANNUS 1930). In the next section this argument will be pressed further. These several conditions occurring in native races in different parts of the world at first sight may appear very varied, though in more recent cases those who have recorded their observations have sought to explain them all on a basis of unbalanced dietaries.

In studying these various communications in many of which the authors have been at pains to give a differential diagnosis from pellagra I have been struck by what would appear to be a failure to appreciate many of the facts about that disease. It is given to few medical men to have the opportunity of studying pellagra. The abridged accounts of the disease which appear in text books are many of them based on the observations of the last century and contain many statements which are calculated to give a wrong impression of the affection while at the same time many facts of importance are omitted. In this section it is therefore my intention to discuss the symptomatology of pellagra with a view to clearing up some points about which there has been a good deal of misconception.

H F HARRIS (in 1919) wrote "It is unquestionably true that the name given to this disease and the striking character of the dermal symptoms have resulted in these manifestations being accorded an undue and wholly unjustifiable prominence in the minds of many who have written on the subject." All practical pellagrologists

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from the earliest periods have recognised that the symptomatology pellagra is not limited to those obvious and very pronounced phenomena which characterise the fully developed disease.

That the disease was a generalized affection was recognised by Cajetani STRAMBIO (1789) when he defined pellagra as *Motus chronicus totius corporis, cerebri nervorumque functiones potissimum laedens, ut plurimum cum desquamatione doni manum, & pedem allarumque aevi expositarum partum sive est syndromes etiam quae retulimus symptomatum inter quae praecipua & frequenter sunt variae affectiones cutaneae spasm, dolores, vesicæ.*

Pellagra is a disease as A. D. BIGLAND has said (1920) "extremely difficult to diagnose and often overlooked unless the possibility of its occurrence is kept in mind. The diagnosis in most of the cases that are published rests firmly enough upon the presence of that trifling symptom 'Dermatitis Diarrhoea and Dementia,' but while we may admire the alliterative ability of the author of this diagnostic slogan, it is probably true if it be said that nothing has done more to stifle the recognition of early cases and those that do not manifest what has been called the classical symptoms."

HARRIS believes that in an endemic area possibly the majority of cases of pellagra never develop these classical symptoms of the disease, and in this connexion it is of interest to recall the fact that pellagra without skin lesions was recognized by CASAL and later well known by STRAMBIO who used the term "Pellagra sine pellagra," better rendered perhaps by S. R. ROBERTS (1912) as "Pellagra sine Exanthemata." A G. BIGGAR & P. GHAIOTYXCU (1933) have referred to such cases as larval cases and H. S. STANNUS has used the phrase "Pellaga fruste." It may also here be noted that HARRIS thought that the disease tended to be unaccompanied by skin lesions in particular localities more especially in the tropics. The first point then upon which I want to lay emphasis is that pellagra is a disease which may show great variety in the picture which it presents, variety in the extent which the disease takes, variety in the symptomatology and variety in the intensity of individual symptoms. In any single case or small group of cases any one or more of what have been considered typical symptoms may be absent. G. A. WATSON (1923) faced to face for the first time with an outbreak of pellagra among the inmates at Rushill could not believe that the mild type and severe fulminating case were one and the same disease.

It must be remembered that at the one extreme is the one which proves fatal in a few weeks or less and at the other the pellagrist of eighty years of age or more who has suffered from the disease since childhood.

E. RUD (1934) believes that latent pellagra may not be rare and that many cases regarded merely as dyspepsia with anorexia, colitis, neurasthenia, etc. are in reality examples of that disease. With that opinion I am in complete accord.

Among the symptoms which may precede by many years an attack of pellagra in which the classical manifestations are seen, or which may never develop any further are a gradual deterioration of health with some degree of failure of mental and bodily vigour, a tendency to hypochondriasis or mild attacks of mental depression, periodical digestive disturbances with abdominal discomfort and constipation broken by occasional lapses into diarrhoea, a sore mouth, a sore tongue showing scattered enlarged papillæ, sores on the

angles of the mouth and in women leucorrhœa. Other symptoms later may include indefinite pains in the limbs and elsewhere, odd subjective sensations including vertigo sometimes disturbances of vision and hearing. The skin may show a peculiar dryness with formation of tiny scales sometimes limited to uncovered areas sometimes extending over the whole body, and fine wrinkling best seen on the backs of the hands and over the interphalangeal joints.

Of the objective signs the peculiar soreness at the angles of the mouth which I shall speak of as angular stomatitis is one of the most characteristic as was pointed out by H S STANNUS (1913). When once recognized it cannot be mistaken I think with one possible exception for any other condition. This condition together with a marginal glossitis are perhaps among the earliest signs and may anticipate more active symptoms by many years.

They were noted by a few of the older pellagrologists ZANETTI STRAMBIO and others and they have received recognition again in more recent times. Thus A. FAIRHURST (1932) believes stomatitis to be a common early symptom of pellagra. HARRIS and ROBERTS recognized the pre-pellagrous state. Angular stomatitis has been of course noted among native races in the tropics for many years and described as an isolated sign it has been observed in Africa and in the East where it has been attributed to the eating of salt fish. The association may be correct but I do not think it is merely a local reaction as has been suggested. More recently it has been considered to be a sign of an A-avitaminosis and W R AYKROYD writing from the Nutritional Research Laboratories Coonoor enclosing a photograph of an Indian girl showing very beautifully this condition says that it is not uncommon and is closely associated with xerophthalmia both being due he thinks to a vitamin A deficiency. Be that as it may angular stomatitis should be looked upon probably as a prepellagrous sign. This question will be discussed later.

D T DAVIES (1931) and others have remarked a condition closely resembling if not identical with angular stomatitis in cases of achlorhydric anaemia in this country a point also to be referred to later. H J ROPER of Leeds (1931) referring to DAVIES' observations stated that he had noticed the condition for many years and believed it to be due to injury in inserting and removing large dentures. This is only mentioned here in order to point out that Roper must be referring to some other condition. Angular stomatitis does not occur among the ordinary normal adult population of this country. I have looked over many thousands of persons in London without noting the affection.

The early glossitis consists generally in a moist furred tongue with reddened edges and scattered brilliantly reddened hypertrophic papillæ. Associated with these there may be similar affections of the free margin of the prepuce of the vulva and vagina the margin of the anus and perineum.

Attention was drawn to these lesions by STANNUS as valuable signs in diagnosis both in the prepellagrous stage and in the full blown disease when the skin about the inner and external canthi and nostrils may also be affected. These conditions are well known to many pellagrologists but not always recorded and perhaps by some missed because they are not looked for.

Turning now to a consideration of the symptoms of pellagra as they are commonly presented in text-books and as they are commonly

conceived in the minds of perhaps the majority of medical men, and dealing firstly with the dermal manifestations—each spring (or sometimes in the autumn) an acute dermatitis appears on exposed surfaces as the result of the sun's radiations acting on the skin rendered photo-senitive by some substance developed in pellagra, to disappear again in the autumn—is the kind of statement generally made and believed.

"Supprimez le soleil et vous supprimerez la pellagre" said LAROCHE & BOUCHARD in the *Dictionnaire Deschambres*

STRAMBIO (1789) when he wrote "Ergo desquamatio non est ad solis proportionata. Ergo causae non correspondent effectus, sive que praeter solis actionem aliud quid requiratur inter nos scilicet morbo humorum dyscrasia" recognized that something more than the sun's rays was necessary to explain the skin affection, but more important still, he realized that the erythema was not proportional to the exposure to sunshine yet the doctrine of sunshine and erythema as cause and effect was one strenuously upheld by SANDWITH and others and persists to this day in spite of abundant evidence to the contrary. The typical distribution of the exanthem on the backs of the hands, cheeks and nose (the "butterfly area") neck and chest, etc. were held to prove this belief. SANDWITH believed that the terminal phalanges of the fingers escaped because they were hidden from the sun and that vice versa the dorsa of the feet were involved, the area covered by the sandal remained normal. C. MANTHOS (1832) pointed to the fact that a veiled woman in Turkey the face was exempt. The case is also cited of the opposite—a man who habitually walked with his hands behind his back palms upwards, developed an erythema of the palms. The facts are correct as far as they go but as I shall try to show in a later section there may be other explanations.

The explanation usually given fails to account for those cases in which the exanthem develops in the winter—for the fact that it is in the spring rather than the summer when the sun's rays are most powerful that the erythema appears, as pointed out by T. D. SPIES (1835) for the fact that the rash may appear in its typical distribution in patients who have been confined to bed for some time and conversely may be found in these same selected areas in persons whose whole body is exposed to the sun as observed by E. NEUSSER (1887). In the case of G. A. ZELLER cited by J. N. HYDE (1910) a woman in whom the exanthem failed to appear on a paralysed hand although equally exposed to the sun's rays as the other hand on which the rash occurred and a similar case recorded by S. R. ROMBERTS (1929) etc. T. D. SPIES (1835) has only recently alluded to the erroneous view still held by many writers upon this question. They ignore the fact that the pellagrous exanthem may affect any and every part of the skin of the unexposed surface of the body as stated by E. J. WOOD (1927). They have forgotten that the palms of the hands and soles of the feet may be affected. They have ignored the fact that in cases exhibiting the classical distribution the exanthem typically encircles the wrist, bracelet fashion. To those who have studied pellagra closely it has become obvious that there is a tendency for the exanthem to occur in any area of the skin open to trauma of any kind, using the word in its widest sense.

C. C. BASS (1926 and 1929) has cited cases in which points of pressure were affected, the buttocks and elbows in bedridden patients, the back and shoulders also in others, the knees in a woman given to long

prayer. The skin over the course of prominent veins liable to friction by clothing may be similarly attacked. Constant exposure to the heat of a fire will determine the appearance of the pellagraderm as will exposure to X rays or irritation by a chemical such as carbolic acid, ichthyol, a mustard leaf etc. Areas of skin liable to intertrigo may similarly be involved—under the breast as pointed out by C C BASS (1929) the gluteal fold mentioned by S R. ROBERTS (1929) the groins and perineum. The lesions in these latter situations resemble only naturally those already described as occurring about the lips nostrils and vulva. The particular character of the lesions depends upon the histological make-up of the skin to a large extent a point to which I think attention has in so many words never before been drawn. This is particularly true of the skin of the scrotum which when affected is a sign of great diagnostic value particularly as this lesion may be seen when perhaps there is little evidence of pellagra present and no typical exanthem.

It is a sign which appears to be but seldom recorded and one which it seems possible is not looked for and therefore passed over. The condition was discovered in 19 of the 131 cases investigated by STANNUS and in 4 of the 19 there was no pellagrous exanthem.

L. MERK (1911) acknowledges the condition as a sign of pellagra and it is also recognized by HARRIS (1919) G A WHEELER (1930) and by SPIES A D BIGLAND (1920) met with one case among his 64 Turkish prisoner pellagrins and the affection was noted by MENDEL sov in Siam (1919 1923) and by CANTOR (1927) in a case in Melbourne. It is also of interest to recall the fact that this was the condition which first appeared in the convicts subjected to an experimental pellagra producing diet by GOLDBERGER (1915) one upon which the diagnosis of pellagra was based. Reference will be made to this affection later when discussing the condition described by LANDOR & PALLISTER.

Another site which may be attacked although often forgotten is the nailbed resulting as in the skin in pigmentation and deformation of the nails of the fingers and toes. A G BIGGAR & P GRALIOUVCUI (1933) have shown that desquamation in the interdigital clefts is very suggestive. The hair may be thinned and there may be some loss of pigment.

In regard to the typical exanthem itself there are a few points which need emphasis as they appear to be not generally recognized. Usually it is of sudden onset and runs a course of some weeks or months—erythema hyperkeratosis pigmentation exfoliation to healing. In some cases the erythema may be slight and so evanescent as to pass unnoticed. In others the lesion is a severe one Bullae may develop with ulceration and sometimes ecchymosis a permanently altered skin may result.

The severity of the skin lesions bears little relation to the severity of the other symptoms a patient may die of acute pellagra before skin lesions have become evident. Here attention may be called to another matter which has received very little recognition and appears not to be generally known. Some twenty five years ago I observed among native African pellagrins that whereas during the attack successive areas of skin might become involved rapidly one after the other after the attack which lasted a few weeks no further skin lesions appeared although the patients remained under the same conditions of diet and exposure and without treatment. The point was even better exemplified in an English child pellagrin (H S STANNUS

1934) the skin lesions began to heal during a period of observation when the patient was intensely ill, and before treatment had been instituted. Later various exposures to bright sunlight failed to produce any other reactions than those produced in controls. C. C. Bass (1929) had noted what he called the loss of power of epiblastic epithelium to withstand noxious stimuli and that this lasted but a short time, viz. during the active phase.

T D Spies (1931) has called attention to this point. Three white males and one negro kept on a pellagra-producing diet of corn meal mush, corn-meal muffins, pork fat, maple syrup, polished rice, corn-starch pudding, coffee and sugar showed striking improvement. It was thought that the improvement might have been due to the exclusion of alcohol, but the following year this observer (1932) demonstrated that improvement in the skin lesions occurred in eight pellagrins during 6-15 days upon corn-starch and lactose though the stomatitis was adversely affected and again (1932) that the symptoms cleared up in pellagrins while fed over twenty days with an experimental diet more restricted than that used by Goldfarb in producing pellagra in his convicts. T D Spies & H. F. DeWolf (1933) also showed that in ten pellagrins recovery took place when they were given an adequate diet together with a large quantity of corn whisky. Further observations by Spies (1935) are of interest. Recently he experiment he has shown that exposures of areas of pellagrous dermatitis to large doses of U-V radiation or to direct sunlight do not prevent healing of the lesions even while the patient is limited to a pellagra-producing diet but he adds that it is difficult to gauge the effect of such experiments as the pellagrous rash itself is never static—it is either getting worse or getting better. He alludes, of course, here to the acute erythema. The experimental work of Gorham & J. Meyer (1932) was without very definite results, but the fact emerges from these observations—one that I would again emphasize—the

susceptibility—one may call it, to the acute exanthem lasts but a short period of time and is followed by a long "refractory" period. Concerning the explanation of these phenomena I shall have more to say elsewhere. They have received but little recognition, and no attempt has been made to interpret them. A. D. BIGLAND (1920) says: "I was never able to make any skin changes appear at will—I cannot account for this failure."

It will be noted what an important bearing, therefore, the short mentioned facts have on the evaluation of treatment.

One other point—although in classical pellagra "the attack may be expected to recur once a year in the spring up to ten years or more, it must not be forgotten that the interval between attacks may extend to as many years."

Not uncommon, but apparently seldom recognized or seldom recorded, are other affections of the skin known to the older writers STRAMBIO MAJOCCHI and others as seborrhoeic, acneiform, follicular and kerato-follicular pellagra derma. Accounts of these conditions will also be found in the writings of some later pellagraologists—C. C. Bass (1926) S. R. ROBERTS (1929) HARRIS (1918).

They may be present during the acute phases but are often seen in chronic pellagra and are of considerable value in diagnosis. The seborrhoeiform eruption is usually seen on the face, nose, cheeks and forehead, sometimes on the chest or still more widely distributed; it gives rise to the appearance which has been called "sulphur face".

The acneiform condition similarly is found about the nose on the cheeks forehead chin, chest and back comedo formation being more or less marked. A. D. BIGLAND (1920) notes this peculiar seborrhoeic condition on the face with formation of sulphur granules and the branny desquamation over the whole body in some of the Turkish war prisoners. H. KLEINMANN (1931) found what he called hyperkeratosis about the nose in 14 of 63 pellagrins studied in Moldavia and these conditions were common among African pellagrins observed by STANNUS in 1910-11.

The kerato-follicular lesions of MAJOCCHI are equally interesting. They were described by STANNUS as a folliculitis and it may be observed that T. E. H. THAYSEN (1932) has remarked the condition in pellagra occurring in Denmark. It was also noted by YANG & HUANG (1934) in cases of pellagra seen at Nanking. These lesions of the pilo-sebaceous glands vary a little in character some being of the Keratosis pilaris type others resemble Lichen spinulosus others again have somewhat the appearance of *Pityriasis rubra pilaris*. The distribution is rather characteristic—extensor aspects of the arms the anterior and lateral surfaces of the thighs the buttocks and may be the back and chest. They need not be described in more detail they are easily recognized. These conditions will be referred to again when discussing communications by L. J. A. LOEWENTHAL and by L. NICHOLLS. Two skin conditions of importance in attempting a diagnosis between attacks or in some of those cases in which the attack is not apparent may briefly be referred to here. The one is a characteristic persistent increase in the wrinkling of the skin over the proximal interphalangeal joints with slight thickening and change in texture and a peculiar lilac colouration. The second is the appearance most commonly seen in the skin of the shins which looks as if a smooth layer of lacquer had been applied and then cracked mosaic fashion the colour varying according to race in the European a transparent yellow like yellow tracing paper and proportionately darker in the darker races. This is probably the condition to which STRAMBIO referred as being like the skin of a duck's foot.

In old pellagrins the dry smooth, glossy parchment like atrophic skin characteristically seen on the backs of the hands needs no comment.

Associated with the skin lesions some oedema is often present it may be noted in the face giving a puffy appearance and is not uncommon in the lower extremities—a fact often forgotten. A. D. BIGLAND (1920) said from a study of the literature it appears that oedema is a symptom of great rarity. He found only one reference that by KULZ. As a matter of fact it is not uncommon as BIGLAND found in his Turkish prisoners of war. It was noted in my African native cases and has been remarked since the time of STRAMBIO.

In summarizing the point which I wish to make in regard to the skin lesions is that essentially they are all of the same order. They vary only according to the intensity duration and recurrence of the pathological process producing them on the one hand and upon the differences in histological structure of the skin in different parts of the body on the other.

A study of the lesions in mucous membranes will show that the same is true and further that the affections of the mucous membranes are homologous with those of the skin. This point has not been duly recognized but it is an essential one if we would attempt to understand

the method of production of these conditions, a matter which will be discussed in a subsequent paper.

As in the skin so in the mucous membranes the reactions seen in pellagra vary in intensity and vary somewhat according to site. Those that are open to inspection have been described, those that cannot be viewed have been inferred. Beginning with the conjunctiva and cornea, as more nearly allied to the skin in early stages redness and lacrimation with epiphora may be observed. Xerosis has been described from early times phlyctenular ulceration and keratomelana may occur in some proportion of cases. The nasal mucosa is involved causing coryza and sneezing. The varied but characteristic well known changes in the tongue—congestion, exfoliation, etc., are the counterpart of those in the skin. The same is true of the mucous membrane of the mouth, pharynx, oesophagus and larynx. The gums are similarly affected and exfoliation at this site and on the cheeks may give rise to the formation of a pellicle, but true ulceration here as in the skin is probably rare in pellagra. It is sometimes said that the gums are swollen and bleed easily and that this gives rise to the name Alpine Scurvy used by ODOARDI. I believe this is not quite correct—the mucous membrane of the gums is congested and may bleed on injury, gingivitis may be present because the gums are not cleansed properly but the condition present is not in my opinion the same as in scurvy.

In dark-skinned races among whom there is commonly an pigmentation of the mucosa of the mouth, tongue and gums, this pigmentation may be increased. A blue tinge on the inner surface of the cheeks and areas of dark pigmentation on the tongue and gums may be then conspicuous.

Salivation corresponding to epiphora and nasal discharge is not uncommon. Vaginitis, proctitis possibly urethritis, are of similar nature. The characteristic watery diarrhoea suggests that the intestinal tract is in the same way affected. It is interesting to note that in the earlier cases the diarrhoea comes in attacks rather than the erythema of the skin. Here again, I believe that probably alteration of the bowel though it has often been described as such, is not part of true pellagra but a secondary phenomenon.

These various conditions will not be further discussed, but it must be noted that any one or more of them may be absent in any single case or group of cases. A case of classical pellagra may come to be a fatal issue with a normal mouth.

The incidence of some of these lesions may here receive a brief notice. E. WEISS collected statistics in an endemic area in the Tyrol between 1895 and 1907. There were 8,436 cases of pellagra in a total population of 384,073. Of thepellagrins 61.4 per cent. exhibited skin lesions of an erythematous character in nearly half. Of these half the dermatitis affected the backs of the hands in 77 per cent., hands and neck in 13 per cent., neck and other parts 7.5 per cent., other parts 2.4 per cent.

Among STANLEY'S native African prisoners, of a total of 131, 57 showed the exanthem. Of those with exanthem, in 30 it was limited to the backs of the hands, wrists, forearms and arms. In 29 the suprachlavicular regions were affected as well. In 19 all these areas were involved together with the neck. The face was also affected in 12 more. In 8 some part of the legs and body were also involved. In one the whole body was involved.

Of the 97 cases exhibiting the exanthem 26 showed a normal oral cavity in 26 angular stomatitis was present with or without glossitis in 9 the tongue was involved but not the lips In 5 there was a generalized acute stomatitis. The scrotum was attacked in 19 Soreness at the canthi nostrils preputial margin and anus was not uncommon.

Affections of the vulva and vagina were considered to be common in women pellagrins by the Illinois Pellagra Commission (1912)

E D CRUTCHFIELD (1928) found among 109 cases studied at Galveston, Texas that 64 57 per cent showed lesions of mucous membranes. Glossitis was the most common stomatitis was noted in 21 27 per cent, gingivitis in 16 14 vulvo-vaginitis in 12 1 proctitis in 10-09 per cent.

L MERK (1909) on the other hand mentions that in twelve months in the Tyrol he did not see a couple of cases exhibiting buccal or genital lesions!

T R BOGGS & P PADGET (1932) among 102 cases of sporadic pellagra in Baltimore of whom 44 per cent were admitted to hospital on account of the skin lesions (though all had typical skin lesions) found that the backs of the hands were affected in 100 per cent face and neck in 23 5 elbows 12 7 feet 8 8 perineum in 23 74 5 per cent, showed stomatitis.

R H TURNER (1931) discovered glossitis in 26 of 42 pellagrins under observation in New Orleans. A G BIGGAN & P GHALIOUNGUI (1933) in Cairo observed the buccal cavity involved in 24 of 26 cases of pellagra.

Changes in the finger-nails are common according to ANTONINI (1902) ALPAGO-NOVELLO (1894) held that demonstrable changes in the finger-nails were present in 94 per cent. of pellagrins E VERGA (1915) found marked changes in the finger nails in 4 per cent and in the toe-nails in 2 per cent less marked changes in 10 and 12 per cent

It is not proposed here to say much about the other sides of the symptomatology of pellagra but a few observations upon points which I believe up to date have been wrongly interpreted may be made. -

One of the most constant subjective symptoms in pellagra is burning pain and tingling sometimes limited to burning pains in the palms of the hands and soles of the feet sometimes also experienced in areas of skin upon which the erythema will appear in a few in the scalp or the whole body. The burning pains and tingling of the palms and soles are unquestionably of the same nature as those felt elsewhere in the skin and I believe exactly comparable with those in mucous surfaces in the mouth tongue cheeks and pharynx. These sensations are often referred to together with other symptoms as if they were signs of a neuritis By A G BIGGAN & P GHALIOUNGUI (1933) they are mentioned as nervous manifestations I believe this not to be true as I shall hope to show when dealing with pathogenesis elsewhere These burning pains are almost pathognomonic of pellagra, though something of the kind may be found in acromegaly at the menopause possibly in ergotism and the epidemic acrodynia of the first half of the 19th century in France and has been stated to occur in the dry form of beriberi associated with a scaly skin. (1)

Gastro-intestinal symptoms will also be referred to elsewhere digestive disturbances consisting of discomfort after meals a feeling of fullness wind burning sensation pyrosis etc. are present in the majority of cases.

Symptoms pointing to changes in the central nervous system and mental manifestations likewise will not here be dealt with except to remark that many of them in acute pellagra are due to derangements of function and that they may vary in a very short time, in a matter of days well shown in a case under my own care, H. S. STAXTON & C. R. GUNSOV (1934). In regard to mental disease it is not always made clear that the association of a psychosis with pellagra is twofold there is the mental derangement which occurs as a result of pellagra— which forms part of the disease, and secondly pellagra is prone to occur in the insane. The reasons for this will be suggested elsewhere when dealing with the aetiology of the disease. This distinction is often pointed out but it is a very important one. The changes in the blood will also be discussed elsewhere.

Pellagra in children may here receive a word of comment. It has been thought to be a rare affection in children by some, to quote only one recent writer Miss C. WILLIAMS (1933).

J. GOLDBERGER & G. A. WHEELER (1928) during field investigation in S. Carolina demonstrated a preponderance of pellagra incidence in children between the ages of 2 and 15 years. A. FAHMY (1932) found male children under the age of 12 to be particularly susceptible in Egypt an interesting observation in view of the fact that SWANN thought pellagra was rare under the age of 10 and the statement that he had never seen a case under the age of 15 years. Many of SANDWITH's observations however have been proved to need modification and L. SAMSOV (1910) commenting upon the matter pointed out that the erythema in children is often so mild and evanescent that it may escape observation. SAMSOV mentions cases in infants, the youngest being 5 months old. He believed that the incubation period, as he called it might be as short as three weeks.

S. R. LUSTIGER & J. A. K. BRONKHORST Junr (1922) have contributed interesting observations upon pellagra in 5 to 10 months old breast-fed children of pellagrous mothers. The mother develops pellagra during the three winter months on a diet of dried peas and beans, sugar, corn-meal, sugar molasses, salt, hog meat, rice, coffee, canned milk, and lard. The infant is frail, restless, suffers from bouts of diarrhoea, a sore mouth and develops the exanthem, may be on hands and feet. The cases are mild and respond to healthy wet nurse feeding or a diet of good milk, fruit juice and vegetable purée.

E. LEWIS (1926) has given a full account of pellagra in a colored infant of 17 months of age which will serve as a good illustrative case.

Loss of weight noticed on September 1. On November 1 eruption noted behind knees. There were four loose foul smelling stools per day. The child was apathetic but fretful, emaciation more marked, both feet oedematous. Pigmented areas then appeared behind the left ear and at the forehead—the skin of the chin, chest and shoulders became dry and scaly—the exanthem with desquamation then noted on the backs of the hands and wrists and right forearm, the dorsum of the penis, scrotum, perineum, the inner and outer sides of the thigh, the popliteal space and calf, the right buttock and lumbar region—the dorsa of the feet exhibited lightly pigmented areas—the toes were purplish in colour there was desquamation of the soles of the feet. Angular stomatitis was present, the gums were inflamed and the mucous membrane of the right side of the mouth congested. The child recovered on being given yeast, beef, and cod-liver oil.

LAVINPIK has seen pellagra in nursing mothers—he thinks the tongue is often affected before other symptoms appear than the gums, followed

by gastro-intestinal derangement and lastly the exanthem with pain in limbs about the joints.

D. L. SMITH considers that the earliest manifestations in infants are on the nervous side then diarrhoea sore mouth and later the rash which is more commonly noted in the pubic region on the neck and forehead more rarely on the backs of the hands and feet. Probably many die of diarrhoea before the diagnosis is made.

C. J. Bloom (1928) writing upon the subject says "The infrequency of pellagra in infancy and childhood is without proof or substantiation. From his figures for annual numbers of deaths in children from pellagra there would appear to be more deaths in the first five years of life than in the second or third 5-year periods in the proportions 458 424 383

These are of course cases of pellagra fully diagnosed it seems very possible that many milder cases go undiagnosed in young children.

THE NATIVE MEDICAL PRACTITIONER IN THE WESTERN PACIFIC AND THE CENTRAL MEDICAL SCHOOL IN SUVA FIJI.

By Thomas CLUNIE M.B. Ch.B. Medical Superintendent Colonial War Memorial Hospital Suva
and

V. W. T. McGREGOR M.B., Late Inspecting Medical Officer Fiji

General Remarks.—Great Britain, France and the United States of America with respect to the health of their native peoples in certain of their Colonial possessions in the islands of the Southern Pacific Ocean are participants in a scheme under which native youths are sent to a Central Medical School at Suva in the Colony of Fiji, where, after a four years course of studentship, they are returned with the diploma of Native Medical Practitioner to serve under their respective administrations.

The participating administrations.—Those of the administrations participating in the scheme which are British owned fall within the following classes—

(a) All territories administered by the Governor of Fiji as Governor and High Commissioner of the Western Pacific, which include the colonies of Fiji and the Gilbert and Ellice Islands, the British Solomon Islands Protectorate, the native Kingdom of Tonga, and the condominium of the New Hebrides in which France is the other partner.

(b) All the tropical island territories which are administered by the Government of New Zealand comprising the Cook Islands, the Mandated Territory of Western Samoa and the Tokelau Islands.

(c) The phosphate producing island of Nauru which is administered under mandate by the Commonwealth Government of Australia.

The United States Government is interested with respect to the Territory of Eastern Samoa where the Navy Department has established an efficient health service and the introduction of the Native Medical Practitioner may only be experimental. France's participation is limited to her interests in the New Hebrides Condominium.

The native peoples of the Southern Pacific.—The administrations participating in the Native Medical Practitioner Scheme can be representatives of each of the three main subdivisions of the Pacific Islanders namely, Polynesians, Micronesians and Melanesians, and while there exist as between Polynesian and Micronesian on the one hand and Melanesian on the other marked differences both in physical characteristics and mental capacity, all of the three peoples prior to European intervention were in the Neolithic stage of civilization. Similarities in diet and climate and the diffusion of culture which resulted from the great Polynesian migrations that are said to have taken place in spite of primitive craft and vast ocean distances, have tended further towards the creation of affinities and the obliteration of differences in the form of their social systems. Since the communal form of society is found to be universal in its distribution, it is a factor of great importance in framing a government suited to the character and requirements of the Pacific islanders, and the ultimate success of

any public health undertaking depends on the extent to which it can be moulded into the framework of their society. In the realm of disease affinities are taken a step further because with the exception of malaria which is confined to the New Hebrides and Solomon Islands identical problems arise everywhere as regards both indigenous diseases and those which have been introduced with European colonization.

The estimated population at the 31st December 1931 in each of the administrative units was as follows —

Fiji	185,573
Gilbert and Ellice Islands Colony	33,699
British Solomon Islands Protectorate	94,000
Kingdom of Tonga	28,830
Western Samoa	47,000
Cook Islands	11,500
Niue	3,834
New Hebrides	50,000–60,000
Eastern Samoa	10,184

All of these places are intimately concerned with the problem of depopulation which has been solved in Fiji largely through the agency of the Native Medical Practitioner and which is now being hopefully attacked on similar lines in the other places.

The Native Medical Practitioner in Fiji — The native kingdom of Fiji was formally annexed to Great Britain at the request of its chiefs and people on the 10th October 1874. A medical service was afterwards inaugurated and in the first Colonial Estimates prepared for the year 1875 provision was made for the salaries of a Chief Medical Officer and one District Medical Officer. In June 1888 an Ordinance entitled the Native Medical Practitioners Ordinance was passed by the Legislative Council in preparation for the issue of their certificates in January 1889 to the first eight Fijians to qualify as Native Medical Practitioners. The credit for the introduction of this service must be given to Dr B. Glanville CORBETT an early Chief Medical Officer whose work in this and other directions has been an inspiration to his successors. He saw the urgent need for some organization that could rapidly economically and effectively break down the barriers of prejudice and superstition. He recognized the prohibitive cost of maintaining an adequate service of European Medical Officers and the insuperable difficulty of finding a group of professional men psychologically and physically fitted to deal with such a situation. Experience of the devastating effects of the measles epidemic of 1875 and the advent of Indian immigration had drawn attention to the necessity to protect the natives against smallpox. European vaccinators were tried but they proved too costly and were not invariably satisfactory. Young natives had already been tried as dressers and dispensary assistants and it was decided to entrust them with the greater responsibilities of public vaccinators. Their success in this capacity seems to have led to the establishment of the Native Medical Practitioner and the institution of the Native Medical Practitioner may thus have been largely due to the necessity to make vaccination less costly.

Once it was created there was no difficulty in fitting the new service into the organization of the medical department of Fiji under which the Colony is subdivided into medical districts to which European

Medical Officers are posted as far as possible. With the advent of the Native Medical Practitioner the main districts, in proportion to their size and population were divided into subdistricts to which Native Medical Practitioners were posted and made responsible under a District Medical Officer for the health of the natives. The popularity which the service gained from its inception, the recruitment of its personnel from among the most influential native families its cheapness and the ease with which it fits into the native social organization have been outstanding factors in promoting its success in Fiji. It has also been found that in most instances Native Medical Practitioners bear the strain of responsibility surprisingly well, and this attribute is enabling the Government to withdraw European Medical Officers from several districts and to adopt a Colony-wide policy of concentrating on hospital and public health services. In the changing conditions of Fiji it has become necessary in some instances to extend the duties of Native Medical Practitioners from the purely native to the general community nevertheless the essentially native character of the service has been maintained under a system of rigid Government control which discourages Native Medical Practitioners from obtaining employment in a private capacity.

The success of the Native Medical Practitioner service is dependent on its low cost and the retention by its members of their native character. Any tendency to regard it as other than a subordinate service would be liable to upset the delicate social and economic balance on which its success depends.

In computing the value of the salaries of Native Medical Practitioners it is necessary to take account of the benefits that accrue to those members of the native communal society in the form of service, food and gifts, and taking all the circumstances into consideration their salaries are maintained at a level which is commensurate with the dignity of their position, and they secure as well the advantages of Civil Servants with respect to pension.

As regards their number the Native Medical Practitioners in the Fiji Service were for many years restricted to twenty, but the expansion that has taken place under the influence of improved training facilities has brought about the steady increase in the personnel which is illustrated in the following table —

Number of appointments	Year
10	1890
17	1900
33	1910
39	1920
51	—
59	1930
	1933

The Indian Medical Practitioner — It was thought on account of the success of the Native Medical Practitioner Service as a means to contend with the native health problem that a similar system might be introduced for the benefit of the growing Indian population of Fiji. The Central Medical School was accordingly opened to Indian students and the first of these to qualify received his certificate in December 1925. Practical experience has shown that a system which could advantageously be moulded into the social system of the community living natives could not confer equal benefits upon the individual Indian community and under the present circumstances the Indian

branch of the Service cannot advisedly be expanded beyond a limited number of appointments to hospitals and dispensaries in Indian districts with the addition possibly of one or two travelling appointments. The certificate of the Central Medical School except in Government appointments does not entitle Indian graduates to practise and in all the circumstances it is desirable that this limitation should stand.

The Native Medical Practitioner outside Fiji—Prior to the introduction of the present scheme for training natives from the different administrations at the Central Medical School only two Native Medical Practitioners had been employed in a permanent capacity outside the Colony. One of them Sowani Puaman qualified in 1899 and in 1905 he was transferred to the Gilbert and Ellice Islands Colony. He quickly proved his worth as administrator as well as doctor and in 1918 he was put in charge of the Medical Department of the Gilbert and Ellice Islands Colony. Prior to his secondment to Fiji in 1935 he was awarded the distinction of the Order of M.B.E.

The other was Wilsoni Lagi and he with the permission of the Fiji Government did valuable work in New Guinea as a medical missionary under the auspices of the Methodist Mission Society. These two are isolated instances and the extension of the Native Medical Practitioner as an actual service beyond the confines of the Colony of Fiji was a direct result of the post war campaign work in the Western Pacific of the International Health Division of the Rockefeller Foundation and of the realization by the Foundation's officers that the ultimate success of their work was dependent on the establishment within each administration of a permanent health organization. They also realized that such a service must combine the advantages of low cost and adaptability to native conditions and they found the solution of their problem in Fiji where under very similar conditions the Native Medical Practitioner system had been in successful operation over a period of several decades. Through the very generous financial assistance that was afforded by the Foundation it became possible to extend these benefits to other Pacific administrations.

The Central Medical School—As a result of the negotiations that were conducted between the Rockefeller Foundation and the Government of Fiji and of the Foundation's financial assistance the buildings and equipment of the old Suva Medical School were extended and improved in time for it to be opened in 1928 as the Central Medical School with 40 students in residence drawn from seven separate administrations. The responsibilities for carrying out all of the local arrangements devolved upon Dr Aubrey MONTAGUE the late Chief Medical Officer of Fiji. Dr Victor G. HEISER, late Divisional Director of the International Health Division of the Rockefeller Foundation was among the first to appreciate the importance of enlarging the Native Medical Practitioner Service and his advocacy was instrumental in securing the Foundation's approval. The Fiji Government readily consented to make the Native Medical Practitioner available to any other Administrations that desired to enter the scheme.

Evolution of Teaching—The earliest students limited in number to eight learned their profession in the wards of the old Colonial Hospital where they worked as dressers and male nurses receiving clinical instruction from the Resident Medical Officer and practical guidance from Miss M. C. ANDERSON who held the post of Matron with

great distinction for many years. This was the training which produced those pioneers whose work gained for the Native Medical Practitioner the high reputation which he now enjoys. In 1901 the amenities at the school were improved by the addition of a two-storied residence capable of accommodating twelve students of a special lecture theatre and of some rudimentary scientific equipment. Theoretical teaching was gradually incorporated into the syllabus, while the practical side of the course has also improved with the steady increase in volume of the work of the Colonial Hospital. In 1923, when the old hospital was replaced by the present substantial Colonial War Memorial Hospital the Medical School seems to have been overhauled and the students' lectures had at first to be conducted in an ordinary room, but in 1927 the whole scope of the school was enlarged a preparation for its becoming the Central Medical School. Its quarters were extended to accommodate forty students. A new school building was erected of ferro-concrete with a lecture theatre, laboratories, a museum and a library and equipment was provided to meet the requirements of teaching. At the same time the teaching system was expanded and reorganized a full-time tutor was appointed, and lectureships in the subjects of a course that had become very similar to that of an English medical college were distributed to medical men and others who willingly accepted posts as honorary lecturers. In 1935 a further important advance was made when a Pathological Laboratory was presented by the Rockefeller Foundation, and a highly qualified pathologist was appointed to take charge of it. In 1931 the period of studentship had been increased from three to four years, and since the school is closely affiliated with the hospital, students are given the fullest opportunities to gain practical knowledge by participating in its activities. It can be claimed with full justification that the standard of teaching makes the graduates of the Central Medical School competent to assume on their own initiative the ordinary responsibilities of Medical Practitioners and health officers.

English as the medium of instruction.—Since the students are drawn from places where different languages are spoken, English is used as the medium of instruction and among its other advantages this measure by requiring a somewhat high standard of school education tends to raise the intellectual level of the average student. In some Administrations the standard of school education is much lower than that of Fiji, and in the case of the Solomon Islands this dictum has necessitated a temporary departure from the important principle of admitting only students of pure native blood as that Administration's quota could only be filled by admitting two students of mixed blood and its need was too urgent to permit delay.

Adaptation of teaching to the mean intellectual level of students.—As regards their intellectual capacity students of Polynesian and Micronesian origin are on a higher plane than those of Melanesian origin, and much ingenuity has been shown by the tutor and the school staff in adapting the teaching to the intellectual level of the average Melanesian without sacrificing the subject matter of the course, or unduly retarding the education of the more able students.

Cost of the Central Medical School.—The scheme under which the expenses of the school are shared between the participating Administrations requires each government to fill its quota for a specified period to pay fees on a *pro rata* basis and to pay a forfeit with respect to each unfilled item in its quota. This simple and equitable arrangement

has worked satisfactorily. The all in *per capita* cost of students at the Central Medical School amounted to £73 in 1934. Only Government students are admitted to the school and no student is admitted in a private capacity.

Administration.—The Governor of Fiji and High Commissioner for the Western Pacific is the supreme authority in the administration of the Central Medical School and he is assisted by an Advisory Board consisting of Dr S. M. LAMBERT of the Rockefeller Foundation, the Secretary of the Western Pacific High Commission, the Medical Superintendent Colonial War Memorial Hospital and the Director of Medical Services who is the Board's *ex officio* chairman. The title of Tutor was changed to that of Principal on the 1st January 1936. No administrative difficulties of any consequence are caused by the heterogeneous origins of the students and in the maintenance of discipline the Principal is loyally assisted by the head student and by a Students Council. There is also a fine *esprit de corps* in the school which is perpetuated in the lives of its graduates.

Preservation of native character in school life.—The diploma of Native Medical Practitioner as its name implies is intended to be awarded to graduates of pure native blood. The term Indian Medical Practitioner is applied in the case of East Indian graduates who have been trained in the school in circumstances that are peculiar to Fiji. The essentially native character of the service is stressed as much as possible in the living conditions of the students who are encouraged to dress themselves after the manner of well bred natives and to retain all of their native manner of living that is possible under conditions of studentship. This ensures as far as it is possible to do so that graduates shall return to their homes with a wholesome respect for the customs and manners of their own people and glide easily into their proper groove in the native social system whence they can most readily spread the knowledge they have acquired. There is no present need for a service of native doctors with qualifications approximating European standards and if a time should ever come when it may be desirable to train natives for positions of the highest responsibility in the medical services of the Pacific Islands it will be fitting to give them the benefits of the more comprehensive education that is available in a large medical college in Australia or New Zealand and to permit the Central Medical School to continue in the discharge of its present useful function. Any raising of the status of its diploma towards a European level would defeat the objects of the Central Medical School both by encouraging the graduates to demand higher rates of salary and by removing them from their place in their native social environment. Since therefore the retention of the diploma at its present level would seem to be fundamental to the purpose for which the school was created the safeguarding of this principle cannot be regarded as reflecting unfavourably either on the staff or the students of the Central Medical School.

Supervision of Native Medical Practitioners.—In the case of Fiji it has been found that regular inspection tends to encourage Native Medical Practitioners to keep their efficiency at a high level and this principle being applicable everywhere should be practised as far as circumstances allow. But there is no justice in the argument which is not infrequently heard that in the absence of inspection the work of a Native Medical Practitioner ceases to be of value for it has been refuted by the example already quoted of Sowani Puaman and by the conduct

of countless others working under conditions of isolation. The enlarged scope of the service must embrace new situations in which Native Medical Practitioners will be almost completely on their own initiative and it is therefore fortunate that they have proved themselves capable of rising to such occasions and that their training in the Central Medical School definitely aims at inculcating a spirit of independence of thought and action.

The similarities that are found everywhere in the conditions under which Native Medical Practitioners are working demand the application of uniformity and continuity of policy. Pending the unification which is contemplated to embrace the medical services of most of the participants in the scheme, and the introduction of a system of regular inspections from headquarters in Fiji, centralisation has already advanced far enough to enable the Native Medical Practitioner service to be controlled as a single unit with reasonable efficiency. The most important of existing co-ordinating influences is the recognition by the High Commissioner for the Western Pacific and by the Government of New Zealand of the Director of Medical Services in Fiji as Central Medical Authority with respect to the other administrations. He receives valuable assistance and advice from Dr S. M. LAMBERT who as the representative of the Rockefeller Foundation maintains a very close personal touch with the affairs of each Administration. A system is also in force under which regular reports on the work of the Native Medical Practitioner are received from each Administration, and commented on by the Central Medical Authority. Again from the standpoint of the Native Medical Practitioner close touch with the school and with one another is maintained through the agencies of the Post-graduate department of the Central Medical School and of a journal entitled the Native Medical Practitioner which is published twice yearly at the school. The Post-graduate school provides a very comprehensive refresher course which can accommodate four Native Medical Practitioners every year and which is keenly sought after by them. The school journal contains many articles written by Native Medical Practitioners and constitutes an important advance in their education.

While a Native Medical Practitioner is believed to exercise his maximum efficiency when working in the Administration of which he is a native and it is not considered advisable to make general the practice of transferring these officers between different administrations the general uniformity of conditions which exists throughout the islands where the system is in force has permitted of a Native Medical Practitioner of one group being successfully employed in another. Instances of this are to be found in the cases of the British Solomon Islands Protectorate and the New Hebrides Condominium, where the selection of suitable native students has presented temporary difficulties and vacancies in the Native Medical Practitioner Service have been filled satisfactorily by natives of Fiji.

Child Welfare—No report on Medical activities in the South Pacific can be regarded as complete without some reference to Child Welfare Work which has been carried out with amazing success in Fiji since its introduction in 1927 and which is being extended through the Native Medical Practitioners to the other territories. Child Welfare now forms a special subject in the syllabus of the Central Medical School, and both students and Post-graduates are given very practical training in these duties in the native villages situated

in the Suva neighbourhood. Experience has shown very clearly the necessity both for keeping the level of Child Welfare Work within the capacity of the native women and of delegating to them as much as possible of the responsibility for carrying it out. The main object of the work is to inculcate a spirit of self reliance and it would inevitably be defeated if the natives were led to believe that success is in any way dependent on complicated health surveys by scientifically trained officials or by the use of drugs and food substitutes. All this is not to deny the great value that attaches to visits of inspection by persons qualified to help and advise and it is in this direction that Native Medical Practitioners keep the work at a high level of efficiency by maintaining the closest possible touch with the village workers. It has been observed in the case of Fiji that Child Welfare Work has greatly raised the status and importance of the women and that their insistence on cleanliness in the interests of the children is having a remarkable effect in improving the sanitation of the native villages.

Through the influence of Child Welfare public health is being made to enter the lives of these native peoples at birth. Its persistence during childhood and adolescence is ensured by the teaching of hygiene in schools as well as by the medical inspection of school children and it is safeguarded in their adult life by the extreme accessibility of the Native Medical Practitioner system.

Conclusion—Taken individually the Administrations participating in the Native Medical Practitioner scheme have not the means to embark on elaborate enterprises to provide adequate medical services but by a pooling of their resources as is now the case at the Central Medical School it is felt that they will be able to elaborate a common form of health organization that will bestow further benefits on the native peoples. In Fiji the system has been proved successful after a long and searching trial and if it is too early yet to claim the same success with regard to its more recent ramifications into the other Pacific Administrations the similarity of conditions and the favourable reports that are coming to hand appear to provide full justification for the confidence which those of us who are in the closest touch feel with regard to the future of the Native Medical Practitioner in the Pacific. As the system becomes more permanently established everywhere it will suffer progressively less from the effects of destructive criticism but there will always remain the danger that some over enthusiastic supporters may lose sight of the fundamental cause of its success and in a misguided attempt to raise the status of the Native Medical Practitioner may defeat the purpose for which the school was created namely to make a health service available to these native peoples at a low cost and in the form that is most easily assimilable by their society.

MALARIA.

FEDERATED MALAY STATES. Annual Report of the Malaria Advisory Board for the Year 1933 [Kingsbury (A. Neave) Chairman] - 13 pp. With 1 chart. 1933. Kuala Lumpur F.M.S. Govt. Press.

Monthly returns of malaria cases admitted to Government and estate hospitals in the four States of the Federation indicate that the Federated Malay States has entered upon a period of increasing malaria incidence. Periodicity of malaria in Malaya is erratic, being influenced by Indian and Chinese immigration, the majority of these immigrants are stated to be relatively non-immune. Immigration in its turn is influenced by trade "booms" and "slumps". The Malaria Advisory Board do not consider it likely that a widespread epidemic of very serious and explosive type will occur but precautionary measures have been adopted. Wherever local incidence has been excessive the brush method of oiling at ten-day intervals has been replaced by the original spray method of oiling at seven-day intervals, a change which has been followed by a reduction in the number of cases reported. Such an intensification of larval control is easy of application in areas under the control of the Sanitary Board and on large plantations and mines but in *kampung* areas the control of mosquito-breeding in existing circumstances, is difficult or impossible. For this reason a bill to provide for the destruction of mosquitoes has been drafted and will shortly be enacted.

Reference is made to the results obtained with atebrin *mammisi* (methyl-sulphonate) in the treatment of malaria. This drug was found to be more powerful than either atebrin or quinine in its immediate effects on parasites and on fever. It had, however, no effect on the number and viability of gametocytes. These were able to infect mosquitoes readily on the seventh day after treatment when the drug was still present in the system in comparatively large amounts. The minimum daily effective dose, on each of two successive days, appeared to be 0.3 gm. either intramuscularly or intravenously.

In collaboration with the Malaria Commission of the Health Organisation of the League of Nations experiments are being carried out to determine the value of atebrin as a clinical prophylactic.

The Report contains information regarding the local costs of spraying, the deterioration of open cement drains under the influence of acid water, experiments with faecal drainage, and the control of anopheline breeding by shading. The Anopheline Survey of part of the Selangor Coast Area continues. *A. kyphensis* var. *stansoni* and *A. vittatus* generally considered to be fresh water breeders, are frequently associated with *A. stansoni*, a salt water species. As rainfall increased *A. vittatus* replaced *A. stansoni* completely in certain breeding places.

During the year the mail trains arriving in Kuala Lumpur from Singapore and from Penang were searched for anophelines considerable numbers were found. One *A. aegypti* was found to have a gut infection.

Answers 17/12

ANTONINO (Lambusta) Profilassi antimalaria nelle zone tropicali con speciale riguardo alle nostre colonie in Africa Orientale. [Malaria Prevention in the Tropics with Special Reference to Italian Colonies in East Africa.]—*Ann di Med Nav e Colon* 1936 May-June. 42nd Year Vol. I No 5-6 pp 211-220 With 1 chart & 6 figs on 2 plates. [14 refs.]

This paper was evidently written for the special benefit of medical officers working in Italian Colonies in East Africa. It contains some general statements regarding the importance of malaria as a cause of morbidity and death in tropical countries a description of the more important anopheline vectors in East Africa and a good summary of anti-malaria measures. The plates illustrating the characteristics of African anophelines are reproduced from Memoir No 3 1927 of the Liverpool School of Tropical Medicine

N IV

KEMP (W H W) & CLARK (H. C) A Fifth Year's Observations on Malaria in Panama, with Reference to the Failure of Atabrine to control an Epidemic.—*Amer Jl Trop Med* 1936 Mar Vol 16 No 2 pp 109-131 With 1 chart [10 refs.]

It is not only useless but even harmful to attempt to control malaria by means of drugs in a hyperendemic area like Panama.

The authors conclude — It is galling to make a confession of failure but our recent experience and the deductions of other workers lead us to believe that under our local conditions it is to the people's best interests (and ours) to interfere as little as possible with the course of their malaria infections. Our main object increasing the efficiency of native labor may be accomplished by treating only those actively ill among the adults and allowing the children to build up an immunity through repeated attacks of the disease treatment can be entrusted to an intelligent native practicante and may be instituted without the necessity for time-consuming expensive blood-surveys. For such treatment atabrine would seem to be the drug of choice because of its lack of toxicity ease of administration and rapid curative effect. For six years they have been carrying out experiments with the object of controlling malaria in villages by means of drugs and during the last two years they have treated every person found positive with atebrin gram 0.2 daily for 5 days followed by plasmoquine 0.02 gram daily for a further 5 days. As regards plasmoquine there were cases with toxic reactions but they were not so frequent as when the two drugs were given simultaneously. The authors believe that there is little use in administering plasmoquine in therapeutic doses for the purpose of destroying crescents because in 90 per cent. of their crescent cases the crescents appeared on the first day on which parasites were found and had doubtless infected mosquitoes before treatment was begun. This together with the severe toxic effects sometimes associated with its use lead us to believe that no results can be obtained sufficient to warrant the use of this costly drug.

Malaria in Panama as elsewhere, is subject to cyclical variations. An epidemic of malaria swept over the country in January 1935. The villages under prophylactic drug control with atebrin and plasmoquine not only suffered as much as the control village they suffered even more. During the epidemic period every person living in the atebrin treated villages whose blood was positive was treated

until negative but nevertheless the parasite rates continued high. In some of the atebirin-treated villages the incidence of malaria was greater than in the untreated controls. Heavy infections and severe cases were commoner and the proportion of crescent casts was greater. "Some unfavorable factor was active during the epidemic period, and we believe this to be the lowering of the natural immunity (or tolerance) of the community, caused by relative freedom from low-grade infections. In the usual course of events as typified in the control town of Chilibre only the clinical, disabling infections would be treated by the patients themselves leaving the substantial, low-grade chronic infections to shoulder untreated. We have interfered with this natural course in our treated towns by endeavoring (with a considerable degree of success) to stamp out even the low-grade, chronic infections, particularly those which occur in young children. The results of this interference developed during the epidemic period. A high infection rate, an increased number of clinical cases, and a great increase of heavy infections occurred, particularly in those towns most thoroughly treated." A high crescent rate was associated with the high rate of heavy infections especially in children. (See just below.)

The authors draw attention to the occurrence of malaria in certain waves. They do not believe that the peaks of malaria incidence are due to an abundance of mosquitoes but ascribe them to variations in the immunity of the population. They point out that, in judging the value of any method of malaria control, it is necessary to determine in advance the natural trend of the malaria rate. The literature is full of reports of successes which were judged successes because malaria rates dropped after control measures had been instituted at the top of the peak of incidence.

The authors have found that quinine provided without supervision of treatment in the expectation that such a measure will reduce the malaria parasite rate among a native population is a delusion and an indefensible waste of money.

[See this *Bulletin* 1935, Vol. 32, p. 784 for authors report on last year's observations.]

NOVRESTREOC (E.) Le paludisme à la Martinique (Martinique).—*Bull. Soc. Path. Exot.* 1935, Feb. 12, Vol. 29 No. 2, pp. 193-202. With 1 map.

Malaria in Martinique is a less serious disease than in most other islands of the Antilles. Europeans seldom suffer and blackwater fever is unknown. All three types of parasites have been found. The author found parasites in about 5 per cent. of 2,000 slides examined. He considers that it would be easy to control malaria because it is limited to certain parts of the island where it could be dealt with readily. If so.

MORIN (H. G. S.), GASCHRO (H.) & NOUVEL DIXI-HAO. Recherches sur le paludisme des routes d'accès au plateau du Tram-Vinh.—[Malaria on the Routes to the Plateau of Tram-Vinh].—*Bull. Soc. Med.-Chirurg. Indo-chine* 1935, Nov., Vol. 13, No. 9, pp. 1231-1246. With 4 figs & 1 chart.

Malaria at a high altitude.

Malaria is very severe, and blackwater fever is common at the military station of Nonghet, near the plateau. It is situated at an

altitude of 1,500 metres (nearly 5,000 feet) in about 19° north latitude. The carrier is *A. minimus*. The following anophèles were found at almost every station from the plains to the plateau *A. minimus*, *A. maculatus*, *A. sinensis*, *A. japonicus*. The authors conclude that the highlands have been contaminated by immigrants and soldiers who have come from hyperendemic areas.

II F

GEAR (H S) A Note on Malaria in China. The Chinese Medical Association Hospital Survey—*Chinese Med Jl* 1936 Feb Vol. 50 No 2. pp 131-136 With 1 fig

Twenty-five hospitals in provinces throughout China co-operated in returning records of all new patients treated both in ward and dispensary for the year 1934. The results can be taken as an indication of the seasonal incidence of malaria in China as a whole. Malaria patients apply for treatment throughout the year, the greatest numbers in the summer from June to September and the smallest numbers in January and February. Malaria accounted for 1.6 per cent of all patients treated. Benign tertian was the commonest type of infection. All types occurred throughout China. Benign tertian had its peak in July quartan in October malignant tertian in November.

II F

STROMQUIST (W G) Malaria Control in the Tennessee Valley—*Civil Engineering* 1935 Dec Vol 5 No 12 pp 771-774 [Summary taken from *Public Health Engineering Year* Washington, 1936 Feb 29 Vol 16 Signed J A LEPRINCE]

This is a short discussion of the malaria problem of the Tennessee Valley in connection with the construction of four large lakes of irregular outline in a malarious territory. It is probably the best article written in recent years dealing with engineering phases of malaria problems connected with impounding of water on a large scale. The total shore lines to be cared for will approximate 2,500 miles. The writer gives a clear and concise idea of control procedure which will be of decided value to engineers on other large projects both here and in other countries and invites attention to the way in which the water power operating officials co-operate in malaria elimination. Better quicker and less costly methods of malaria control are desirable and the author refers to experimental studies now being made towards these objectives. Three chart diagrams show the influence of water level fluctuation and anti larval operations on anophèle production in the lakes. The information given covers up-to-date practice and the experimental work and data being collected will be of decided future value.

EARLE (W C) PALACIOS (L D) & ARBOA (A.) Methods used to control Malaria in Puerto Rico—*Puerto Rico Jl Public Health & Trop Med* 1936 Mar Vol 11 No 3 pp 431-456 With 6 figs. [Spanish version pp 457-478.]

Malaria here is best dealt with by permanent drainage carried out by engineers.

Malaria abounds in the main endemic centres of Porto Rico because of natural conditions it is not man made. The most densely populated

parts of the island are the most malarious. The principal factor is the cultivation of sugar-cane drainage favours this and, at the same time, limits the breeding of *A. albimanus* the carrier. In the past inspectors were sent to search out and treat cases of malaria. The authors think, was waste of money. Many of the people with parasites were not ill. If every malaria patient with active symptom could receive the few days treatment necessary to relieve him of his attack, the greatest amount of good would be obtained at the least expense. *A. albimanus* breeds in almost any natural water depression too densely covered by vegetation. Larva-eating fish prove useless minor drainage work and Paris green required too much supervision and were too costly the authors came to the conclusion that permanent engineering methods such as subsoil drainage, flooding with sea water etc. were necessary. Details are given of various ways of dealing with swamps by short-circuiting the rivers which feed them.

For the present at least the problem should be looked upon as one requiring a period of years for solution. Most of the breeding areas can be permanently destroyed by various types of drainage operations no matter how limited the resources, a little work of this type should be done each year." W. F.

BOGOJAWLENSKI (N. A.) Ueber friedliches Zusammenleben von Gambusien und Anopheleslarven in der Natur [Protozoal Symbiosis of Gambusia and Anopheles Larvae in Natural]. Arch. f. Schiffs- u. Trop. Hyg. 1936. May Vol. 40. No. 5 pp. 201-203.

The observations were carried out in the spring and summer of 1935 in the district of Lenkoran, the most southern part of Azerbaijan. In the rice fields are many breeding places of mosquitoes. The vectors of malaria there are *Anopheles maculipennis*, *A. hyrcanus*, *A. superbus*, *A. pulcherrimus* and *A. bifurcatus* but *A. maculipennis* is the most important. The spleenic index is 61 and the Ross index 34. Gambusa, the larvivorous top-minnow is present in practically all the pools of water in Lenkoran but in spite of this, malarial mosquitoes are very numerous not only in summer but also in winter. He considers that the simultaneous occurrence of these small fish and anopheles larvae is not accidental, but is a definite biological association. One cause of the failure of the Gambusa to attack the mosquito larvae is the enormous number of water plants in the streams. Not only did this vegetation hinder the fish from attacking the larvae, but it also afforded them abundant food in the form of animal and vegetable organisms causing them to ignore the larvae as a source of food. The author's observation is not an isolated one, and others are quoted by him from the literature. So in Lenkoran they cannot expect any help from this antimalarial measure, although these small fish in other parts may be useful for the purpose.

E. D. IV Geog.

RYBINSKY (S. B.) & OVCHINNIKOV (M. M.) Experiment on rearing Gambusa in Ponds near Kiev (Ukraine) — Рис. д. Малоросс. Сер. I 1935. Vol. 14 No 4 pp. 369-378 [22 refs.]

The fish died in winter when the ponds were covered with ice. Gambusa *affinis* was first brought to Russia in 1928 it flourished

in the Abknasian subtropical climate and rendered oiling superfluous so that in a single tropical station the rearing of Gambusia curtailed by 200 000 roubles the expenses for the anti malarial clearing of ponds. The extension of propagation in the colder northern districts therefore became important. Successful experiments were carried out at Odessa by PRENDEN and his colleagues where the fish lived for 3 months under ice and multiplied well during the following summer. The authors therefore tried to breed them at Kief. Gambusia were put into pools in June 1933 and by October they had multiplied enormously. Some were then put into small ponds with stream water and subaquatic vegetation. In December they could be seen swimming underneath the ice the water temperature was 3°C the fish had food in their stomachs. By the following April all were dead probably from lack of oxygen shortage of food or the accumulating of toxic substances in the water rather than from cold. The authors urge that the larva-destroying value of indigenous fish should be more thoroughly investigated

W F

DE CAMELIS (F) La polinevrite malarica. (Contributo clinico) [Malaria Polyneuritis]—*Riv d' Malariaologia* Ser I 1936 Vol 15 No 3 pp 222-228. French summary (7 lines)

Polyneuritis is not a common complication of malaria. Its occurrence would appear to be determined by the intensity of the infection and certain climatic conditions. It often comes on gradually at the beginning of convalescence. The importance of making an early diagnosis is stressed so that specific treatment may be adopted forthwith. A typical case is described in detail

N II

DERRASCH (G) CALO (A) & BUCARELLA (AL) Syndrome nerveux aigu polymorphe chez une hérédité spécifique au cours d'un accès pernicieux de paludisme —*Tunisia Med* 1936 Jan. Vol 30 No 1 pp 16-20 With 1 chart

CLEMENTS (F W) A Papuan Field Experiment of Malaria Treatment.—*Med Jl Australia* 1936 Feb 15 23rd Year Vol 1 No 7 pp 235-237 With 1 map

Fifty-one patients suffering from subtertian malaria were treated approximately one half with quinine and the other half with atebrin. The drugs proved equally effective. The only by-effect was tinnitus in the quinine series. No observations were made as to the rate of relapse nor would they have been of any value since the experiment was carried out in a hyperendemic area.

W F

RAGIOT (Ch.) & MOREAU (P) Deuxième série d essais thérapeutiques d une nouvelle formule à base d alcaloïdes totaux suractives du quinquina. [Treatment of Malaria with Cinchona Alkaloids.]—*Bull Soc Méd-Chirurg Indochine* 1936 Apr Vol 14 No 4 pp 353-360

A record of the treatment of three cases of malaria one infected with *P. falciparum* another with *P. malariae* and the third with *P. vivax* with injections of the total alkaloids of cinchona reinforced with additional hydrochlorate of quinine. The results were uniformly unsatisfactory. The preparation used was reported to have given

satisfactory results in Morocco. The authors remark that hyperendemic malaria of certain tropical countries, of which Cochinchina is one, is a much more serious disease and, at times, much more refractory to treatment than is malaria in more temperate climates. They think that this fact may explain certain contradictory therapeutic results obtained in different parts of the globe. A.W.

MANSON (D.) Tebetren Treatment in Malaria.—Records of the Malaria Survey of India. 1936. Mar. Vol. 6. No. 1 pp 19-25

The number of cases treated was very small. The author's summary and conclusion are as follows—

Tebetren was tried in a series of 21 cases of malaria and the relapse rate was 14.3 per cent. Tebetren reduced the duration of the febrile period in malignant tertian malaria in comparison with quinine but had no advantage in benign tertian cases. No bad after-effects followed treatment with tebetren.

Tebetren is an advance on quinine in the chemotherapy of malignant malaria and is worthy of further trial. The relapse-reinfection rate is considerably reduced and toxic after-effects are absent. (See this Bulletin, 1935 Vol. 32, p. 387) W.F.

KNOWLES (R.) Monkey Malaria. [Correspondence.]—Brit. Med. J. 1935 Nov. 23. p. 1020

The plasmodium which exists as a harmless commensal in the blood of the Malayan monkey *Silenus tarsi* produces a virulent infection when injected into the common Indian monkey *Silenus rhesus*. This letter is written to point out that this observation was first made by NAPIER and CAMPBELL (this Bulletin 1932, Vol. 29 p. 700). They were examining the blood of an *tarsi* monkey (wrongly identified at the time as *Cercopithecus pygerythrus*) in connexion with the experimental transmission of kala azar when they came across the malaria parasite accidentally. They inoculated three other monkeys with its blood, two *Silenus tarsi* and one *Silenus rhesus* with the result that a fulminating attack occurred in the *rhesus*. The strain was then handed over to Colonel Knowles's laboratory, where the experiments were carried out which were summarized in this Bulletin 1932, Vol. 29, p. 700, and in later numbers. W.F.

NALCK (E. G.) & MALAMOS (B.) Ueber die Wirkungsweise des Malariaheilmittel bei Affenmalaria. (Pt. American.) [Nach d. Action of Antimalarial Drugs in Monkey Malaria.]—Klin. Woch. 1936 June 20. Vol. 15 No. 25 pp. 888-891 [20 refs.]

An experimental study of antimalarial drugs in monkeys infected with *P. knowlesi*.

Monkeys received half an hour after intravenous injection of atebrin or quinine an intravenous injection of blood containing large numbers of *P. knowlesi*. Immediately following the injection parasites could be observed in the peripheral blood. Shortly after the contact of the parasites and the drugs morphological changes were noted in the former. The alterations produced by quinine and atebrin were different. In the case of the latter a solution of the parasite occurred whilst in the case of the former solution rarely occurred, usually 1

thickening and shrinking of the protoplasm which stained more intensely.

The occurrence of these morphological changes in the treatment of animals in which the reticulo-endothelial system was intact and in animals after splenectomy and blockade of the r-e system must be interpreted as a direct action of the drug on the parasite.

E D H Greig

CHOPRA (R. N) & MUKHERJEE (S. N). The Trend of Immunity Studies in Malaria.—*Indian Med Ga* 1936 Jan Vol 71 No 1 pp 34-39 [36 refs.]

A general review of the mechanism of immunity in malaria KRISHNAN showed that acquired immunity in monkeys belonging to susceptible species was generally associated with latent infection but in resistant species immunity often occurred without this. In birds on the other hand immunity disappears if the latent infection is cured (See this *Bulletin* 1934 Vol. 31 pp 179 and 463) TALIAFERRO found that the serum of immune birds did not protect normal birds. CANNON and TALIAFERRO (this *Bulletin* 1931 Vol. 28 p 494 1933 Vol. 30 p 726 1935 Vol. 32 p 425) showed that immunity in birds is cellular and consists of an increased rate of phagocytosis by the reticulo-endothelial system. They believed that the macrophages were stimulated by some opsonic antibody BECHOLD demonstrated that the negative charge of bacteria is reduced when they are sensitized by an immune serum and it is evident that both agglutination and phagocytosis resemble the coagulation of colloids where charged particles on the reduction of their electric charge approach one another and conglomerate BROWN and BROOK (this *Bulletin* 1933 Vol. 30 p 830 Vol. 31 p 352) showed that the electric charge on red cells was reduced in malaria and that this reduction promoted phagocytosis. Serum from an immune bird reduced the charge on cells from a normal bird but this action was non-specific because the serum also reduced the charge on cells from any species of animal and even on bacteria. Brown noted the charge reducing action of the globulins in the serum and this fraction is increased in malaria. Although the existence of specific antibodies has not been directly demonstrated indirect evidence from an analogy of the physical and serological behaviour of blood in both malarial and bacterial infections has been brought forward in support of this view Chopra and his colleagues (this *Bulletin* 1934 Vol. 31 p 179) have found that the charge on infected cells is lower than that on healthy cells In the ring stage of the parasite the charge is slightly higher than normal in the mature stage it is much lower It has recently been found that changes in the plasma are perhaps more important than the electrical charges on the individual cells and the question of artificially inducing such alterations in the blood may come up for consideration for the purpose of promoting immunity against this disease (See this *Bulletin* 1933 Vol. 30 p 827)

IV F

MOCHKOVSKA (Ch.) Les relations entre l'hôte et le parasite dans le paludisme Considérations générales sur l'immunité et la virulence (Premier mémoire)—*Bull Soc Path Exot* 1938 Mar 11 Vol. 29 No 3 pp 274-278

BOYD (Mark F) & STRATMAN THOMAS (W. K.) The Transmission of Quartan Malaria through Two Consecutive Human-Anopheline Passages.—*Amer Jl Trop Med* 1936, Jan. Vol. 16, No. 1 pp 63-65

The author has already reported (this Bulletin 1933 Vol. 30, p 85) the successful transmission of two strains of *P. vivax* by means of *A. quadrimaculatus*. He now reports the further passage of one of these strains to a second series of patients by means of *A. quadrimaculatus* infected by feeding on one of the 3 patients in the first series. Satisfactory gametocyte production in the second series did not permit further passage by mosquitoes. All the attacks began as quartan intermittents and subsequently showed a tendency to become double quartan and later triple quartan or quotidian. H F

BOYD (Mark F) & KITCHEN (S. F.) The Comparative Susceptibility of *Anopheles quadrimaculatus* Say and *Anopheles punctipennis* Say to *Plasmodium vivax* Grassi and Feletti, and *Plasmodium falciparum* Welch.—*Amer Jl Trop Med.* 1936, Jan. Vol. 16, No. 1 pp 67-71

Anopheles quadrimaculatus and *A. punctipennis* proved to be approximately equally susceptible to both strains of *P. vivax* employed in these experiments, but while *A. quadrimaculatus* was susceptible to all the strains of *P. falciparum* employed, *A. punctipennis* was very susceptible to some and quite resistant to others. The capture of wild *A. punctipennis* with a gland infection has never been reported, and only a single instance of a stomach infection has come to notice. "It does not appear likely despite its susceptibility that it is a factor of any consequence in the propagation of malaria parasites." H F

BOYD (Mark F) STRATMAN THOMAS (Warren K.) & KITCHEN (S. F.) On Acquired Immunity to *Plasmodium falciparum*.—*Amer Jl Trop Med.* 1936, Mar. Vol. 16, No. 2 pp 139-143

Homologous immunity but no heterologous immunity after infection with *P. falciparum*.

Recovery from infection with *P. vivax* is followed not only by immunity to the same strain but also by a very definite though less effective immunity to other strains. On the other hand, a patient who has recovered from an attack of subtropical malaria, even though he still has parasites in his blood, is not immune to a heterologous strain, and inoculation with such a strain will produce an attack which may be as severe as the first. *P. falciparum*, however, produces homologous immunity, that is to say re-inoculation with the same strain will not result in a second attack though it may result in a slight increase of the parasites in the blood. This homologous immunity lasts about four months after the infection appears to have been eradicated. H F

BOYD (Mark F) STRATMAN THOMAS (W. K.) & KITCHEN (S. F.) On the Duration of Infectiousness in Anopheline carriers of *Plasmodium falciparum*.—*Amer Jl Trop Med.* 1936, Mar. Vol. 16, No. 2 pp 157-158.

The infectiousness of mosquitoes with *P. falciparum* deteriorates much more rapidly than their infectiousness with *P. vivax*. After

the mosquitoes used in these experiments had matured their infection with *P. falciparum* the authors stored them in a Frigidaire, between 3° and 14°C. They found that nearly every person became infected who was bitten by these mosquitoes during the first 10 days. Subsequently the effectiveness of the mosquitoes declined rapidly and no inoculations were successful when more than 40 days had elapsed after the completion of the extrinsic incubation period (this Bulletin 1934 Vol. 31 p 701) W F

BOYD (Mark F) KITCHEN (S F) & MULRENNAN (J A.) On the Relative Susceptibility of the Inland and Coastal Varieties of *A. crucians* Wied., to *P. falciparum* Welch.—Amer Jl Trop Med 1936 Mar Vol. 16 No 2 pp 159-161

Root has shown that there are two strains or varieties of *A. crucians*—a coastal and an inland strain indistinguishable as adults but differing as larvae. The authors found no difference in their relative susceptibility to *P. falciparum* but they proved to be poor hosts in comparison with *A. quadrimaculatus* W F

RAMSAI (G C) CHANDRA (S N) & LAMPRELL (B A.) A Record of an Investigation to determine the Anthropophilic Indices of Certain Anopheline Mosquitoes collected on Tea Estates in Assam and Northern Bengal.—Records of the Malaria Survey of India 1936 Mar Vol. 6 No 1 pp 49-52

Infectivity surveys comprising 100 000 dissections have shown that *A. minimus* constitutes 98.3 per cent of the specimens infested with malaria. The precipitin test shows that this mosquito is highly anthropophilic. *A. leucosphyrus* also prefers human blood but the authors have not found it acting as a vector. It was not prevalent in the area under investigation. Out of 622 *A. minimus* 85 per cent contained human blood of 102 *A. leucosphyrus* 75 per cent. of 311 *A. kawesi* 18 per cent. Less than 10 per cent of the following contained human blood *A. maculatus* *A. hyrcanus* *A. kochi* *A. subpictus* *A. annularis* *A. vagus* *A. splendidus* W F

VOLLNER (Ortrud) Kleiner Beitrag zur Kenntnis der Verbreitung der Anopheles im Rheinland. [Distribution of Anopheles in the Rhine District.]—Arch f Schiffs u Trop Hyg 1936 June Vol. 40 No 6 pp 255-259 With 1 fig

The author was very surprised at finding that not one courtyard investigated in the Rhine and hill districts between Elberfeld and Düsseldorf also in Cleve, Uedem and Geldern was without Anopheles. The Anopheles were found in the cattle and pig stalls they preferred dry dark, sheltered corners. He noted three races of *Anopheles maculipennis* var *atropars* var *messiae* and var *typicus*. He describes the eggs of these three varieties as halfgrey dark and striped.

The author considers the question of anophelism sine malaria in Germany an important one and hence the necessity for accurate knowledge of the distribution of their Anopheles.

E D W Greig

SERULCI (Piero) & DE NEGRI (Lgo) Osservazioni sull'anofelismo nel delta del Po e zone limitrofe. [Anophelism in the Po Delta and its Vicinity]—*Riv di Malariaologia* Sez. I. 1936. Vol. 15 No. 3 pp. 193-206. With 6 figs. on 1 plate & 1 map. French summary (4 lines)

This is the report of an anopheline survey of the Rovigo Province which contains the Delta of the Po. Systematic captures made in twenty-four localities show that in the coastal belt *A. distans* largely predominates. Further from the sea *tijucensis* and *maveri* are chiefly in evidence. Certain abnormalities of egg structure are noted.

RAFFAELE (G) & LEGA (G) L'anofelismo nella piana di Rieti. Nota preventiva. [Anophelism in the Rieti Plain—An English Summary]—*Riv di Malariaologia* Sez. I. 1936 Vol. 15 No. 1 pp. 23-31. With 5 figs (1 map) English summary

The Plain of Rieti lies at the foot of the Sabini mountains, around the Lakes Lungo and Ripasottile and about 400 metres above sea level and has a radius of about 6 kilometres. Anopheles abound there. *A. maculipennis* the *macerae* variety predominating, but *A. strobli* and *A. m. melasoon* are also found, in the period from May to October. Thus of 400 egg deposits examined 372 were *macerae* 18 *strobli* and 10 *melasoon* or 93.45 and 2.5 per cent respectively. One hundred and eighty-eight mosquitoes were tested by the precipitin method to determine their feeding source—whether cattle horse pig sheep or man. Of these 29.8 per cent. gave reactions for cattle and man next 22.3 for cattle only sheep and pigs were equal—6.3, and only 5 and horse 2 per cent. It will be seen that just over 36 per cent had fed on man. The inhabitants of the district number nearly 50,000. In spite of the prevalence of Anopheles there is said to be no known malaria.

BIZERRA (Acervo) Transmissores da malária no Brasil.—*Riv di Malariaologia* Sez. I. 1936 Jan. 5 Vol. 17 No. 1 pp. 4-7

MATHIS (C) Elevage d'*Anopheles gambiae* à Paris. [*Breeding A. gambiae* in Paris.]—*C. R. Soc Biol.* 1936. Vol. 121 pp. 21-22.

The author has bred these Anopheles successfully in his Paris laboratory from specimens imported from the West Coast of Africa. They are now in their 6th generation. They are harder to breed than in the tropics. The water for the larvae was aerated with a pump sock as is used for amateurs aquarium tanks. Glass rods are put in the vessel in order to prevent air bubbling violently through the water. When the temperature is very cold the water is kept warm. The larvae are fed on *Chlamydomonas* sp. *Chlorella vulgaris* and a *Planktoctenes*. The adults, which copulate readily in a small space, are fed on gelatope or on human volunteers, and are kept in cages covered with a dark cloth.

WANSON (M.) Influences de la salinité sur la faune culicidienne [The Influence of Salinity upon Mosquito Breeding]—Ann Soc Belge de Médecine Trop 1935 Dec. 31 Vol 15 No 4 pp 587-598.

The author has found that the Anopheles of Banana (*A. gambiae* is the only species) consist of two groups long wings and short wings. The short wings come from the crab-holes and small tidal pools where the amount of water is small and the concentration of larvae and waste products high. The long wings come from the big marshes. *A. gambiae* in the laboratory deposited eggs in water containing as much as 60 grams of chlorine per litre but not in that containing 80 grams. The favourite concentration was up to 25 grams. The larval cycle in nature was habitually completed at concentrations between 15 and 40 grams per litre and sometimes in concentrations as high as 55-41 and even 61-20 grams. In the higher concentrations development was delayed and the imagos were smaller than normal. W F

TREILLARD (M.) La biologie des espèces anophéliennes du groupe *minimus-funestus* et son utilisation pratique A propos de récentes expériences [Biology of Species of the *minimus-funestus* Group of Anopheles.]—Bull Soc Path Exot 1936 Apr 1 Vol. 29 No 4 pp 396-402.

The author is anxious to make better use of existing knowledge of the biology of *Anopheles minimus*. He contrasts it with its near relations of the *funestus* group in South Africa.

In the author's experience in Annam and Cochin China *A. minimus* is often numerous in houses, it is apparently very long lived and it is known that it prefers the blood of man so that without doubt it is one of the major carriers of malaria. The natural breeding places are often scattered and difficult to discover so that control by any larvicultural method may be incomplete and expensive. The view is put forward that it would be worth while to attempt to control the insect by killing adults in houses by insecticidal sprays used once a week. It does not appear that this has been carried out in the countries in which the author has worked but as he points out DE MEILLON and PARK ROSS in South Africa appear to be convinced that measures should in practice be directed against the adult *funestus* rather than the larva.

P A Buxton

DE MEILLON (Botha) *Anopheles funestus* Giles and *Anopheles leesonii* Evans in Human Habitations and Outdoor Haunts.—Ann Trop Med & Parasit 1936 Apr 8 Vol. 30 No 1 pp 1-2.

The critical discrimination of the females of *Anopheles funestus* and *leesonii* is a matter of great difficulty which the author overcomes by selecting only those which are gravid and identifying them by the structure of the unladen eggs. This of necessity limits the number of specimens capable of critical identification and it might introduce a source of error if the females of one species entered houses and took human blood but left the house before the eggs had matured.

The figures here published appear to show that the proportion of *Anopheles* infected with *Plasmodium* is considerably higher among those caught in houses than in those caught out of doors, also that *An.* rarely caught in houses. As tests for significance have not apparently been employed it is not easy to know how much reliance can be placed upon the published figures—the amount of material available being at present rather small.

P. A. B.

- i. WEYER (Fr.) Ueber den Cl-Gehalt und das pH verschiedener Brutgewässer von *Anopheles maculipennis* in Norddeutschland und die Beziehungen zur Rassenfrage. [The Cl-Content and the pH of Various *Anopheles maculipennis* Breeding Places in North Germany, and their Relation to the Racial Question.]—Reprinted from *Acta Hydrobiologica* 1934 Vol. 27 pp. 595-608. With 3 figs. [13 refs.]
- ii. MARTINI (E.) Ueber den Salzgehalt der Gewässer und die Rassengrenze. [The Salinity of Bodies of Water in Relation to Race.]—Reprinted from *Entom. Beiträge Berlin-Dahlem*. 1934, Abt. 1 Vol. 1 pp. 23-44. With 3 figs.

i. In the *Anopheles* region of North Germany especially in E. Friesland Neuwerk I., the Elbe marshes, Mecklenburg and on the Pomeranian coast numerous *A. maculipennis* breeding places were investigated as regards their Cl-content and the pH. In typical breeding places in E. Friesland (usually small pools for watering cattle, 5-10 metres in diameter with overgrown banks) the Cl-content was from 0.034 to 0.681 per cent. and the pH from 6.8 to 8.2 per cent. In Mecklenburg in certain places the Cl-content is as high as 3.0 per cent. As regards the area occupied by the race *strobiferus* in Germany and in Holland, the Cl-content of breeding places is on the average considerably lower in the former than in the latter. In the part of West Germany where this race occurs the water in the breeding places is very often fresh. Eggs of *strobiferus* were frequently observed in fresh water pools, and conversely in certain cases eggs of the race *maculipennis* were found on water the Cl-content of which was high (brackish water). The same fresh and brackish water pools also yielded eggs of the typical race. In the course of the year the Cl-content of a body of water probably as a result of climatic conditions, varies considerably. There is no strict correlation between the presence of a given race and the Cl-content of the breeding places but hitherto the race *maculipennis* exclusively has been found only in fresh water districts, while brackish water is a preferred medium in the case of *strobiferus*. Since, however, *strobiferus* larvae are very frequently met with in fresh water also, the race as regards its ecology shows itself to be more labile and adaptable than *maculipennis*. A reliable deduction as to the racial character of an *Anopheles* population cannot be based solely on the Cl-content of the breeding places.

ii. After a general discussion chiefly concerning the differences between the races (or species?) *A. maculipennis strobiferus* and *A. m. maculipennis* and their local occurrence in Germany and other parts of Europe the author settles down to the real problem, namely conditions in the Danube delta, some light on which is thrown by the following percentages quoted from ZOTTA.

- Pruth Valley near Galatz absolute malaria index 35
- Danube Valley between Galatz and Tulcea absolute malaria index 27
- Danube Delta, below Tulcea, absolute malaria index 6

In the Danube Delta the rare *mesciae* occurs almost exclusively further south, where a broad sandy tract separates Delta and sea, *atroparvus* is found. In the Danube villages despite the fact that they are infested solely by *mesciae* malaria indices are very high more than 60 per cent of the school children show signs of the disease and the idea that *under no circumstances* can *mesciae* be responsible for malaria endemics must therefore be abandoned. On the other hand this by no means amounts to proof that as a vector of malaria it is just as efficient as *atroparvus*. Nevertheless shortly after the War a wave of malaria swept over a great part of Rumania including the Delta which had largely been deprived of the protection afforded by cattle and throughout the Danube area whether severely or slightly attacked *mesciae* is practically the only race of *Anopheles* that occurs.

The lowness of the malaria rate in the Danube Delta is possibly due in the first place to the well nourished condition of the population children included. A second factor is somewhat paradoxically the abundance and bloodthirstiness of mosquitoes especially *Mansonia richardsi* which breeds in the reed swamps in myriads and whose attacks combined with those of other species cause the universal use of mosquito nets. Thirdly about four times as many cattle are kept in the Delta as in other parts of Rumania so that deviation of *Anopheles* thereby is correspondingly greater. The relative sparseness of the population and the fact that summer temperatures in the Delta are lower than those elsewhere in Rumania must also be taken into account and all this goes to show that in the Danube Delta the race of *Anopheles* is not in itself the decisive factor.

When searching for a purely *atroparvus* area in the Dobrudja near Constanza where there are brackish water lakes behind the coast line the author found a solitary cottage which with a well filled cemetery was the sole remains of a village otherwise obliterated by malaria. The local mosquito however proved to be *A. claviger* which is also responsible for the existence of severe malaria along the coast to the south and has experimentally been shown to be especially resistant to salt water even more so than *atroparvus*. That in the *A. maculipennis* group the more dangerous forms appear to display this resistance can hardly be fortuitous. The wide distribution of *Aedes salinus* and *A. caspius* two salt fast species found along the shoreline from the Mediterranean to Scandinavia would seem to show that ability to breed in salt water is of advantage in the struggle for existence. The development of the malaria germs depends upon the warmth of the environment and the importance of the races of *A. maculipennis* from the point of view of malaria must vary with their temperature constants and the localities that they prefer. If the salt faster forms are also the heat faster there must as was believed by GRASSI and older German physicians be some connexion between brackish water and the degree of danger from malaria. This being so free irrigation with fresh water coupled with good drainage will afford an entirely new method of malaria prophylaxis in *A. maculipennis* regions and will curb the activities of the dangerous anopheline races. E. E. Austin

EVANS (A. M.) Notes on Anophelinae. I.—Description of *Anopheles marshalli* var. *gibbosa* from Uganda. II.—The Characters of *A. maculipennis* var. *mescacea* in Wirral, England.—*Ent. Test. Med. & Parasit.* 1935, Dec. 18, Vol. 29, No. 4, pp. 49–61. With 1 fig [12 refs.]

I. The variety of *A. marshalli* here described as var. *gibbosa* is not, while in the adult female very similar to the typical form found in the Transvaal, exhibits certain structural differences in the terminalia of the male and also in the egg, larva and pupa. In Uganda as already shown by GIBBONS this variety is a common but frequent vector of malaria at Fort Portal.

II. In 1934 the author noted the presence at Wirral of a form of *A. maculipennis* which, as regards egg- and hibernation-character agreed with var. *mescacea* as described by continental writers. After studying further material from Wirral, including larvae and eggs raised from eggs, the following conclusion is reached—

The form of *A. maculipennis* studied in Wirral, Cheshire, is entirely morphologically almost identical with the Dutch form of var. *mescacea*. The behaviour during hibernation is of the same general type as in Holland, although there appears to be greater variation in respect of experimental conditions, and the period of complete hibernation terminates on a somewhat earlier date. The variable reaction to experimental conditions supports the suggestion made by Professor SWANE-GREBEL (*in litt.* December 22nd, 1934) that the occurrence of early digestion and precocious ovulation as early as December may indicate a biological difference between the forms of *mescacea* occurring in Holland and Wirral, England.

HACKETT (L. W.) & LEWIS (D. J.) A New Variety of *Anopheles maculipennis* in Southern Europe.—*Rev. d' Malariologie* 1935, Vol. 14, No. 5, pp. 377–383. With 1 plate.

On the Mediterranean coast of Spain as also in North-West Italy, Albania and apparently in parts of Yugoslavia and Macedonia, there occurs a variety of *A. maculipennis* not yet recorded as found in Northern Europe and, on the basis of egg, larval and adult characters described in this paper as *A. maculipennis subpalpus* var. *nocturna*. As regards the main points of difference exhibited by this latter subspecies to an already formidable list, it seems that in the egg which is hardly barred— The floats always have a glossy appearance due to the absence or scarcity of intercostal ridges. It is this appearance rather than the actual presence or absence of ridges which distinguishes *subpalpus* from those of *mescacea* and *typicus*, which always appear frosted. In the larva there is a considerable difference between *subpalpus* and *mescacea* in the average number of branches of the non-palmate hair on the fourth and fifth abdominal tergites, and in the former this number is "higher than in *typicus*." In the male two prominent as shown by Albanian specimens, differences, as compared with conditions in *mescacea* and *typicus*, are exhibited by the external view of the harpago. The adult female, on the other hand, agrees in colour with that of other races.

In Albania *subpalpus* is almost always the dominant race of *maculipennis* in stables near fresh water marshes. *Var. Koppi* it oviposits like *mescacea* in open sheets of water and not in ditches.

E. E. J.

SERVAJIAN (Constant) Anophelisme sans paludisme. Le problème des races de *A. maculipennis* — 87 pp. With 3 figs & 1 map [Bibliography] 1935 Algiers Imprimerie Nord Africaine (S Crescenzo)

SERGENT (Et.) & CATANEI (A) Influence du froid sur les œufs d'*Anopheles maculipennis* du littoral algérien [The Influence of Cold on the Eggs of *A. maculipennis* on the Coast of Algeria.]—*Arch Inst Pasteur d'Algérie* 1935 Dec Vol. 13. No 4 pp 511-512. With 1 chart.

The experiments were carried out with the eggs of *Anopheles* caught in the neighbourhood. They were oviposited at a temperature of 25°C and were exposed at once to a temperature of 5°C in which they were kept for varying periods of 1 2 3 4 5 and 6 days before being transferred to the optimum temperature of 25°C. The period of incubation of control eggs left at this temperature was one or two days. The incubation period was lengthened in proportion to the length of exposure to the low temperature after 3 days' exposure it was about 3 days after 7 days it was 7 days after 10 day's exposure very few eggs hatched after 14 days they were all sterilized. W F

TOUMANOFF (C) & HU (S M. K.) Sur le comportement trophique d'*Anophedes hyrcanus* var *sinensis* dans la région de Shanghai [Food Preference of *A. hyrcanus* in the Neighbourhood of Shanghai.]—*Bull Soc Path Exot* 1935 Nov 13 Vol 28. No 9 pp 832-835

A. hyrcanus var *sinensis* is the only *Anopheles* in the district of Kaochow it is most numerous in stables pigstyes and cowsheds where 87 per cent. contain animal blood. Nevertheless there is always a little malaria and by means of investigations with mosquito traps the authors found that the greatest amount occurred when the density of *Anopheles* was at its highest point Precipitin tests showed that 95 per cent. of those caught in houses contained human blood and 89 per cent. of those caught in cowsheds contained bovine blood. It appears that *A. hyrcanus* remains fixed in the neighbourhood of the stable or dwelling where it has first fed. At the time of greatest anopheline density though most of them enter stables and remain there a few enter human dwellings where they feed and remain.

W F

WALCH (E. W) & WALCH SORGDRAGER (G. B) The Eggs of Some Netherlands-Indian Anophelines—*Meded Dienst d Volksgesondheid in Nederl Indië* 1935 Vol 24 No 3 pp 73-85 With 14 figs on 2 plates.

The problem of racial differentiation as exhibited in Europe by *Anopheles maculipennis* may have its counterpart in the Oriental Region where for instance, *A. subpictus* is a malaria-carrier in the Dutch East Indies but not in British India while in different parts of the former *A. hyrcanus* (and its varieties) and *A. aconitus* behave similarly Devoting themselves at the outset to a morphological study of the eggs the authors have been able to compare material from different parts of Java and Sumatra with the descriptions and figures of eggs of Indian anophelines published in 1931 by CHRISTOPHERS and BARRAUD In the present paper detailed descriptions of or (1933)

notes on the eggs of the following species and varieties are given—
A. hyrcanus var. *nigerrimus* *A. derbioides* *A. albostriatus* *A. tessellatus* *A. Kochi* *A. punctulatus* *A. annulans* *A. sundanus* *A. philippinensis* *A. maculatus* *A. aconitus* *A. vagus* *A. malabaricus* and *A. subpictus*.

In certain cases as in the eggs of *A. vagus* and *A. subpictus* notable differences from Indian specimens were found. In Java, *A. subpictus* breeds in salt or brackish as well as in fresh water with corresponding difference in the number of ribs in the egg-floats. As regards the larval stage the clypeal hairs would seem very often to be straight in the former and branched in the latter case. E. E. L.

WALCH (E. W.) & WALCH SONODRAGER (G. B). Over de morfologische eigenschappen van verschillende subsp. diens. [Structural Differences in Eggs of *A. subpictus*.]—Groot Tijdschr. v. Nederl. Indië 1936, Feb. 18, Vol. 78, No. 1, pp. 394–422. With 5 graphs & 3 plates. English summary.

The paper discusses structural differences in eggs of *Anopheles subpictus* (Ross) laid in fresh and salt waters in Java.

In Java this mosquito breeds in waters exhibiting a wide range of salinity up to about 2.49 per cent., a figure which approaches that of sea water. The eggs from fresh and salt waters fall broadly into two types and seven points of difference are enumerated. But both in fresh and in salt water a considerable amount of variation occurs, and it seems that an egg may appertain clearly to one type in most of its characters but to the other type in one or two of them. The former or coarseness of the columnellae on the dorsum, which makes a great difference to the appearance of the egg, seems to be one of the less reliable characters. One is left with the impression that the most constant points of difference are—

	Salt water	Fresh water
Average no. of ribs in float	Under 19	Over 21
Length of float/length of egg	About 0.5	About 0.6

These numerical characters are carefully discussed, standard deviations of means being given.

The authors suggest that perhaps two definite races exist, which produce hybrid intermediates in certain areas. The possibility occurs to the reader that the differences observed are due to some unidentified physico-chemical cause other than salinity and that the solution of the problem may lie rather in the laboratory than the field. P. J. B.

- i. RAYNAL (J.) & GASCHER (H.). Méthode des précipitations appliquée aux anophèles. Résultats en Indo-Chine-Nord.—Bull. Soc. Path. Exot. 1935 Dec. 11 Vol. 28, No. 10 pp. 937–943.
- ii. TOUMAOUOFF (C.). L'épreuve des précipitations appliquée à l'étude des habitudes trophiques chez quelques culicines d'Extrême-Orient [The Food of Mosquitoes in Northern Indo-China as Determined by the Precipitin Test].—Ibid. pp. 943–948.

Both papers report results obtained by applying the precipitin reaction to the blood found in stomachs of mosquitoes in Indo-China.

i. The authors applied their test to individuals of sixteen species of Anophèles, but the figures for many species are small and there are only seven species on which a hundred or more tests were performed.

It was shown that the members of all these seven species feed to some extent on animals *hyrcanus vagus* and *aconis* to a large extent only *mimicus* and *jeyporensis* appear to feed more upon man than upon animal. Work in other directions has already shown that these species in particular frequent houses and that they are most commonly found infected with plasmodium (for instance 3.69 per cent. of 4488 *mimicus* contained sporozoites). The precipitin test may therefore be said to confirm previous work in other directions.

ii. The paper reports tests carried out on common domestic Culicines nearly all of them *Culex fatigans* *Aedes aegypti* and *A. albopictus*. The total numbers were not very high but the conclusion is reached that these species specialize much more in man's blood than does any of the Anopheles species in the locality. Indeed even when they are taken in stables it is frequently found that the Culicines have been feeding upon a human being. The following figures for instance are quoted: 96 positive reactions were obtained for *Culex fatigans* taken from houses and in each case the blood was human. 72 positive reactions were obtained from individuals from stables and of these 61 had fed on man. 11 on buffalo.

P A B

SHUTE (P. G.) Agglutination of the Red Blood-Corpules of Man, Animals and Birds by the Salivary Glands of *Anopheles maculipennis* —*Jl Trop Med & Hyg* 1935 Nov 15 Vol. 38, No. 22 pp 277-278. With 6 figs.

The gland juice of *A. maculipennis* var. *strobriatus* and *messeae* agglutinated the blood corpuscles of man, animals and birds. The salivary glands of *A. claviger*, *A. plumbeus* and 8 species of *culex* produced no agglutination. The glands of male *maculipennis* caused no agglutination.

W F

STRICKLAND (C) & ROY (D. N.) Experimental Malarial Infection of *Anopheles subpictus* Graen (*A. rossii* "type" Giles) —*Geneesk. Tijdschr v Nederl Indie* 1938, Feb 18 Vol. 76 No. 7 pp 387-393 [12 refs.]

A. rossii were fed on persons infected with malaria. The following numbers of mosquitoes were subsequently dissected: 143 which had fed on subtartian cases, 49 which had fed on benign tertian, 29 which had fed on quartan. No gland infections were found but among the mosquitoes fed on the subtartian cases zygotes were found in two and black spores in four. The authors conclude that this mosquito has a very low infection rate with malarial plasmodia in Calcutta even when *A. stephensi* used as a strict control is becoming infected at the rate of nearly 100 per cent. They suggest that the high rates of infection obtained by SOESLO and some other workers may have been due to the use of a subspecies of *A. rossii* in their experiments.

W F

NEOGR (Sukhil Kumar) Study of the Bionomics of *Anopheles sundasicus* (*A. ludlowi*) in the Salt Lakes of Calcutta. —*Records of the Malaria Survey of India* 1936 Mar Vol. 6 No. 1 pp 31-47. With 1 map & 2 charts.

The author discusses the factors which might account for the spread of *Anopheles sundasicus* (*ludlowi*) during recent years in the immediate vicinity of Calcutta.

It has been feared for a good many years that the Salt Lakes, as of many square miles of saline swamp immediately east of the city of Calcutta might become an important breeding place of this dangerous species of Anopheles but it was only in December 1932 that the larvae began to be numerous. The author endeavours to define some of the conditions prevailing in the breeding places hoping to discover the cause of the mosquito's increase. As the species is well known to breed in brackish water he gave attention first to salinity which was determined in 863 samples in which larvae were also found. It is clear from the figures that the species generally breeds in a water of rather low salinity 60 per cent. of the findings being associated with salinity less than 150 parts per 100,000 but occasionally larvae are found in water the salinity of which approaches that of sea water. It would perhaps have added to the value of the work had the author examined for salinity in a number of spots which appeared suitable but from which larvae of this insect were absent. Rather similar figures are tabulated for the albuminoid ammonia and for the plants found in association with larvae also for the mean shade temperature during the months of the investigation. The author devotes some attention to the statistical side of the work and uses correlation and partial correlation to assist him.

An interesting paper is brought to an end by a discussion of the general problem which has so recently arisen and become pressing. Evidence of several sorts leads to the view that, owing to natural alterations in certain river channels, the Salt Lakes are now less salt than they were. This in turn appears to suggest that the change which is in progress might go further and lead to the replacement of this species by some other breeding in fresher water. The problem in fresh-water biology is a fascinating one apart from its practical interest.

P. A. R.

Mussolini (A.) Sulle caratteristiche termiche dei focolai di *Anopheles plumbeus*. II Nota. [Thermal Characteristics of Breeding Pools of *A. plumbeus*]—Riv. di Malariologia, Ser. I, 1933, Vol. II No. 6, pp. 449-458. With 3 figs. English summary (3 fasc).

Following up work recorded in a previous note (this Bulletin, 1933, Vol. 32, p. 807) the author has studied the optimum temperature for development of larvae of *A. plumbeus* and the relations between rate of development and vitality and deduces therefrom their seasonal prevalence and area of distribution. He found that the larvae, though when maintained at 18°-18°C. died in a thermostat at 24°C. Comparing the breeding sites of this species with those of *A. maculipennis* he found that the daily variations of temperature of the former were very little while those of the latter might be as much as 10° higher. On such a basis he divides anophelines into two large groups, one whose development is favoured by a temperature nearly constant, and the other favoured by oscillating temperatures. Thus *A. m. labratur* develops mostly in May and June and the optimum temperatures of its breeding sites oscillate between 15° and 25°C. *A. m. chierii* prefers a somewhat higher temperature, while *A. m. typicus* develops most quickly in water subject to less wide oscillations of temperature. These facts may be believed, play a considerable part in the seasonal prevalence of the different species. Further researches on these matters are to be made in the laboratory and in the field.

H. H. S.

PURI (L. M.) Schematic Table for the Identification of the Indian Anopheline Mosquitoes Part I Adults Part II Full-grown Larvae.—Records of the Malaria Survey of India 1935 Sept. Vol. 5 No 3 pp 265-268 with 1 folding chart 269-273 with 1 folding chart.

Stimulated by the recent publication by TREILLARD of a combination of synoptic table and diagram for the rapid determination of the twenty-one species of *Anopheles* found in Indo-China (see this *Bulletin* 1935 Vol. 32, p 438) the author has produced the present tables wherein similar conventional representations of diagnostic characters are employed. Unhappily the number of species of Anopheline mosquitoes occurring in India is more than double that found in Indo-China, with the result that the postcard size which was sufficient for TREILLARD's table is far exceeded by Puri. Though it is stated that the chart of adults is mainly intended for the use of persons working in the field it is more than doubtful whether either table without becoming rapidly tattered and torn could really be so employed. Again while not without their uses short cuts to identification of this kind should not be regarded as final but must needs be used with caution that this is so is evident from the fact that in certain cases in both tables owing to the system employed the same characters are necessarily shown as common to more than one species or variety

E E A

KING (W V) & DEL ROSARIO (F) The Breeding Habits of *Anopheles littoralis* and *A. indefinitus* in Salt-Water Ponds.—*Philippines Jl Sci* 1935 July Vol. 57 No 3 pp 329-349 With 7 plates & 2 figs

In the Philippines, the two species mentioned in the title are those that breed in salt water and the observations and conclusions recorded in this paper are based on collections of larvae made during twelve months in salt and brackish ponds near Manila. The range of salt concentrations affording optimum breeding conditions for *A. littoralis* differs from that preferred by *A. indefinitus* and salt concentrations and consequently the abundance of the two species are subject to seasonal influences.

A. littoralis is predominant during the dry season when the salt concentration is high and is strictly a salt water breeder doing best in water containing upwards of about 3 per cent. Though capable *sauve de misere* of breeding in brackish or even fresh water it is believed that the species would ultimately become eliminated at low salt concentrations. On two occasions fairly large numbers of normally active larvae and pupae were found in water containing 8.8 per cent. of NaCl this was the highest salt concentration in which breeding of *A. littoralis* was met with. In the higher concentrations larvae displayed a curious thickening or encrustation of the epidermis.

During the rainy season *A. indefinitus* becomes the predominant species, and the breeding of this mosquito is very largely limited to brackish and fresh water. In the dry season when the ponds were slowly evaporating the highest salt reading for water in which larvae of this species were collected was 3.8 this was exceptional, and the degree of tolerance usually exhibited by *A. indefinitus* is considerably lower.

Floating mats of algae of several species occurred in varying concentrations up to 9 per cent. and were characteristic of most of the ponds in which the larvae were found.

E. E. A.

BAISAS (F. E.) 'Notes on Philippine Mosquitoes V. The Pupal Characters of Anophelines under the Myrosynchines Series and Group Xanthia, with Further Comments on the Larvae and Adults of *Anopheles*' *Monthly Bull. Bureau of Health*, Manila, 1935, Sept. Vol. II No. 9 pp 291-339 With 23 plates & 4 figs. [36 refs.]

TREILLARD (M.) Tableau synoptique pour la détermination rapide des anophèles d'Afrique (région orientale et extrême-orientale). I. Adultes—*Bull. Soc. Path. Exot.* 1938 Mar. 31 Vol. 29 No. 1 pp 279-282 With 1 fig

TREILLARD (M.) Tableau synoptique pour la détermination rapide des anophèles d'Afrique (région paléarctique méditerranéenne et zone aethiopienne) I. Adultes—*Bull. Soc. Path. Exot.* 1938 Feb. 2 Vol. 29 No. 2 pp 148-150

MANGALI (R. A.) 'Cannibalism amongst Mosquito Larvae' *J. Army Med. Corps.* 1935 Jan. Vol. 63 No. 1 pp. 51-51

PIRTWOW 'Die Dynamik der Malaria in S.S.R.A. [Dynamik der Malaria in S.S.R.A.]—4th d. Tropenarbeits d. Volksgesundheits-Kommissariat d. SSR Armenien' [1935 Vol. 2] [In Russian pp. 328-331 German summary pp. 300-303.]

Deals with the eradication of malaria in Armenia.

Following the antimalarial measures it was noted that—the percentage of positive findings of the malaria parasite which was 45 per cent in 1928 fell to 15 per cent in 1930 and 28 per cent in 1932.

Plasmodium vivax which was only 48.3 per cent. of all the positive findings has gradually displaced all the other varieties of malaria parasite and rose to 81.4 per cent in 1931 and 77.0 in 1932. *Plasmodium malariae* fell from 29.6 in the period 1924-1926 to 21 per cent. in 1931. *Plasmodium falciparum* fell from 19.2 in 1928 to 11.7 per cent. in 1931. Mixed infections showed a definite decline from 3.3 in 1928 to 1.4 per cent in 1932.

The disappearance of malaria was not uniform in the different districts this was due to physical conditions, large swamps in some districts not in others.

The eradication of malaria during the second five year plan was accomplished by an energetic and rapid reconstruction of all anti-malarial measures drainage inclusion of agricultural and other organizations in the affected areas in carrying out the measures the general use of the dispensary system in town and village, the leadership of the entire medical officials in this work, the establishment of anti-malarial institutions in all the malarial areas which did not power them and educational propaganda.

E. D. W. G.

CAUCHI (J.) BUXTALL (J. D.) & SELLERS (W.) 'Mosquito Breeding in Septic Tanks—West African Med.' *Jl.* 1935 Jan. 1d. 1 No. 3 pp 8-9

Calicine mosquitoes were found to be breeding in various types of septic tanks in Lagos during the month of June. The authors describe

attention to the importance of sealing the covers of such tanks screening the fresh air inlets and setting up the effluent pipe in such a way that its end is under water. They found that the flushing cisterns of water-closets were dangerous as breeding places of the yellow fever mosquito especially when houses were empty and the cisterns undisturbed.

W F

MARTZ (F.) *Les fosses septiques et les moustiques. [Septic Tanks and Mosquitoes]*—*Mouvement Sanitaire* 1936 July Vol. 13 No 147 pp 334-335

The septic tank has many advantages but that it allows of development of mosquitoes is a serious disadvantage. This may occur in the anaerobic section and in the filter. Addition of oil would remedy the mosquito trouble but might interfere with the proper functioning of the tank. Discharge of the oil by the pipe on to the filter would seriously impede the action of the latter oxidation would be prevented and the effluent would pass off unpurified. To prevent mosquito-breeding the author recommends that —

- 1 The pipe discharging the fermented matter should be of large diameter and situated fairly deeply so that the upper oily layers are not discharged.
- 2 The aeration tubes and those of the filter should be provided with a fine-mesh net of unoxydizable metal.
- 3 The joints of the plugs should be sealed with fine sand.
- 4 The fermentation tank should be cleaned out from time to time and the filter once a year

H H S

MAY (Raoul Michel) *L'hexachloréthane dans la lutte contre les larves de moustiques [Hexachlorethane as a Larvicide]*—*C R Acad Sci* 1936 Jan. 20 Vol. 202 No 3 pp 246-247

Hexachlorethane is a solid which evaporates at ordinary temperatures the resulting gas kills larvae and even pupae. A mixture of two-thirds hexachlorethane and one third of talc is recommended for dusting on water. It is specially recommended for watertubs ponds containing water for watering gardens and the like. It is harmless to man and animals. A special advantage is that the gas penetrates to the surface of water covered by weeds and algae.

W F

MAY (R.) *L'hexachloréthane dans la lutte contre les moustiques. [Hexachlorethane as a Larvicide]*—*Bull Soc Path Exot* 1936 Mar 11 Vol 29 No 3 pp 336-342.

Non-poisonous and effective but only tested in experiments on a small scale.

Hexachlorethane (C_6Cl_6) cannot be ground up readily into a fine powder. For use the crystals are dissolved in trichlorethylene and one part of talc is added for every two parts of C_6Cl_6 . The solvent is then allowed to evaporate and the dried powder is distributed over the surface in the same manner as Paris green. It quickly forms a gas which poisons all mosquito larvae and most of the pupae. The talc soon disappears and mosquitoes are not driven to seek new and often

inaccessible breeding places as they are when oil is used. A kilo is required for 100 square metres. It is not toxic for beasts fishes or aquatic vegetation.

W F

WAXSON (M.) Note sur les trous de crabes, gîtes larvaires. [Mosquito Breeding in Crab-Holes.]—*Ann. Soc. Ent. de Mal. Trop.* 1935 Dec. 31 Vol. 15 No. 4 pp. 575-585. With figs.

Boiling water is the remedy.

Banana is a sandy peninsula below sea level at the mouth of the Congo. In the dry weather 2,000 adult mosquitoes were caught from 330 crab-holes there. Most of them were *Aedes* and *Culex*, but 11 per cent. were *A. gambiensis*. In the wet weather when the holes were flooded, larvae were found breeding in them and 29.70 per cent. were *A. gambiensis*. *Aedes aegypti* was not found. The mosquito was neither in the crab-holes on the beach nor on the banks of the neighbouring creek but only in the holes of the land crab. *Anopheles* were found breeding in water aspirated from the holes during the dry weather though it serves as a shelter for the adults at the season. The author destroys them as follows.—Three men beat 1.0 litres of water in large metal containers, and, when it boils, they pour several litres down each hole. The crab pulls itself to pieces and dies at once. Three men can deal with more than 600 holes in a day. Diagrams of the crab-holes are given.

W F

PETERSEN (Magnus C.) Recurrence of Inoculation Malaria.—*Amer. Med. Assoc.* 1938. Mar 7 Vol. 106 No. 10 pp. 773-777

Four strains of benign tertian malaria were employed in the inoculation of 261 patients. Usually the attacks stopped promptly when quinine was given but parasites often remained in the circulation for a long time. In 14 cases parasites were found in thin smears from 6 to 150 weeks after the fever had subsided. The average amount of quinine which had been given to these patients was 44 grammes. In 6 cases a recurrence occurred after 30 weeks, or after a period which was a multiple of this. The temperature curve was more irregular in the recurrence than in the primary attack, and parasites were fewer. It is suggested that in respect of relapses, there is little difference between blood-inoculated and mosquito-inoculated malaria.

JAMES states that the late recurrence at the seventh month does not occur after blood inoculated malaria.

W F

OSGOOD (Edwin E.) Phagocytosis of Malaria Parasites by the Neutrophil Leucocytes of the Marrow.—*Proc. Soc. Experim. Biol. & Med.* 1935 Nov Vol. 33 No. 2 pp. 219-220.

Bone-marrow was obtained from the sternum in 5 cases of uncomplicated tertian malaria, and, in every instance, malaria parasites were found within the neutrophile leucocytes in all stages of digestion from the intact organism to the residual collection of pigment, although there was no evidence of phagocytosis in ordinary blood films which were made at the same time, beyond the occasional presence of pigment granules within the cells.

W F

CORRADETTI (Augusto) Sull'immunità acquisita nella terzana benigna in relazione col trattamento dell'attacco primario [Acquired Immunity in Benign Tertian Malaria Its Relation to Treatment of the Primary Attack.]—*Riv di Malariologia* Sez. I 1936 Vol. 15 No 3 pp 161-170 With 4 charts (3 on folding plate) English summary

The observations described in this paper were undertaken with the object of confirming an opinion expressed in the third general report of the Malaria Commission of the Health Organisation of the League of Nations. This opinion was to the effect that from a strictly scientific point of view no specific treatment should be given during a primary attack of benign tertian fever the patient would then have an opportunity of acquiring a sufficient degree of immunity to prevent relapse.

Fifteen patients suffering from general paralysis were infected with a Madagascar strain of *P. vivax* by means of anophelines. Five of these were given quinine after the first attack of fever. Five others received quinine after the fifth attack of fever and the remaining five after the tenth attack. The temperature was taken and the blood was examined of each patient every day throughout a period of twelve months. The results of these examinations are set out in graphic form. They indicate that treatment of the primary attack of fever after the first access of fever does result in more frequent relapses than when the administration of quinine is delayed and that a longer time is required to develop immunity. On the other hand the total number of attacks of fever suffered by the patient is diminished by the prompt administration of the drug. The author concludes that from the point of view of the patient a reduction in the number of attacks of fever is of greater importance than an acceleration in the acquisition of immunity and that therefore a primary attack of benign tertian malaria should be treated as soon as possible.

N 13

JAMES (S. P.) Chemotherapy of Malaria.—*Nature* 1935 Nov 9 Vol 136 No 3445 pp 743-745

Very little chemotherapy research is done in England owing to lack of money for this purpose.

It has to be admitted that despite some remarkable discoveries existing knowledge on the prevention of malaria is not sufficient. Direct war on the malaria-carrying mosquito is too difficult and too costly for general use and quinine has failed to maintain its old reputation as the sovereign remedy which meets all needs. In support of this conclusion Colonel James instances the recent epidemic in Ceylon and the ineffectual attempts to combat it the failure of antimalaria measures in Mauritius which have cost the government more than 3½ million rupees since 1909 the even more expensive and less successful antimalaria work in Lagos and the immobilization of the English French and German armies by malaria in the Struma valley during the war. More knowledge is needed in many different directions one of them being chemotherapy in which subject British chemistry has as yet played only a very small part. This seems surprising when we reflect that of the 3½ million deaths from malaria recorded in the world every year the great majority occur in the British Empire and that the British Empire alone spends every year about £450 000 on quinine. It is not expected of course that in England funds available for chemotherapy research will ever be provided on the same scale as in Germany.

but having regard to the humanitarian, economic and imperial interests at stake it is greatly to be hoped that something will be done about it." W F

MEGAW (John) A Simple Method of checking the Strength of Stock Mixtures of Quinine [Lab Demonstration]—Trans. Roy Soc Trop Med & Hyg 1935, June 30, Vol. 30 No. 1 pp 41-4.

The requirements are —

- (1) Quinine test reagent consisting of pure phosphotungstic acid 1 oz., dilute sulphuric acid (B.P.) 5 oz., rectified spirit 12 oz.
- (2) Control solution of quinine of the same strength and composition as the mixture to be tested, e.g., 10 grains to the ounce.
- (3) A few test tubes of equal calibre—about $\frac{1}{2}$ inch by 3 inches.
- (4) A marked pipette to deliver about 2 c.c.
- (5) A small pipette marked so as to measure 0·2 c.c.

Method

Put 2 c.c. of the test reagent in each of two test tubes. Add $\frac{1}{2}$ c.c. of the control solution to one tube and mix well immediately by reversing the tube five or six times while keeping it closed. Add $\frac{1}{2}$ c.c. of the mixture under test to the other tube, mix well immediately. Then mix the contents of both tubes simultaneously and place the tubes in a vertical position.

If the two solutions have been treated in exactly the same way no difference in their strength will be indicated within 10 minutes by differences in the height of the supernatant liquid, and in half an hour by differences in the height of the precipitates.

If the stock mixture is stated to be 5 grains to the ounce the control solution must of course be the same and 0·4 c.c. of each of the quinine solutions must be added to the tubes containing the test reagent.

Do a few preliminary tests first using two solutions of the same strength and then solutions of different but known strengths and the technique is mastered. Note that if the quinine solution is not immediately mixed after being added to the reagent, variations in the precipitate will result.

The purity of the stock quinine powder can be tested by comparing a solution made up on the spot with a control solution made from pure quinine.

The method is not suitable for accurate quantitative estimation of the strength of mixtures. W F

STATISTICAL BULLETIN METROPOLITAN LIFE INSURANCE COMPANY
1935 Oct Vol. 16 No. 10 pp. 7-8—The Rising Menace of
Malaria.

It is an undisputable fact that any community can now rid itself of every trace of this disease if it so desires. All that is necessary is the application of the principles laid down by General Gorgas in his work in Cuba and the Panama Canal Zone more than 30 years ago. About 97 per cent of all malaria cases in the United States occur in the south-eastern section of the country. In each of the 13 States included in this area, there has been an alarming increase in malaria mortality since 1930. These increases have ranged from 24 per cent in Missouri and Arkansas to 140 and 169 per cent in Louisiana and Mississippi, respectively. In 1934 there were 4,520 deaths in the entire United States ascribed to malaria—a malaria prevalence of at least 900,000 cases in the United States at the present time. W F

[The Canal Zone is hardly rid of every trace of the disease.] W F

CHOLERA.

VAN HUNSEL (J. H. F. E.) De uitroeiing van de cholera en de strijd tegen de pokken in Nederlandsch Indië met eenige epidemiologische beschouwingen betreffende in Nederland voorgekomen pokken-epidemieën. [The Eradication of Cholera and the Campaign against Smallpox in Netherlands India.]—*Geneesk. Bladen uit Klin. en Lab voor de Praktijk* 1936 33rd Ser. No. 12. pp 373-410 (1-38) With 2 maps [43 refs] [Summary appears also in *Bulletin of Hygiene*]

In this monograph many interesting points of history and practice are considered. Of the three main tables contained in the work the first is the most interesting. In it the two diseases cholera and smallpox with their mortality and morbidity are set out for British India and collectively for Java and Madoera from 1912 to 1935. The population of British India in 1921 was 318,942 000 and of Java and Madoera 34,884,171 in 1920. We find from the table by summation that the number of deaths from cholera in British India was during the years 1923-1934 2,490,409 and for Java and Madoera only 17 of which 16 were in the year 1927 and one in 1928. It seems evident that the great improvement in the Netherlands Indies as regards cholera must be set down to the introduction of pipe water supplies reorganization of the public health service large scale vaccination insistence on certificates of vaccination for immigrants and pilgrims and strict quarantine regulations. The map given for the distribution of cholera cases in Eastern ports of 1934 is rather significant in its showing of infection in all important ports of British India, Siam, French Indo-China, China and the Philippines with complete freedom of those of Netherlands India, Australia and New Zealand. It is obvious too that consideration will have to be paid to the question how far air services may modify the present state of affairs.

In the case of smallpox a glance at the table and the map of distribution in 1934 show that this disease although reduced to negligible proportions has not been completely eradicated from the Netherlands Indies. Only one case seems to have occurred in Sumatra in 1934 and one in Java a marked contrast to the 1,529 recorded for Calcutta. A most interesting reference is made to what is now past history—the development of the production of a thoroughly reliable vaccine lymph. This is especially associated with the name of NIJLAND who maintained that any great multiplication of institutes for this purpose was quite unnecessary. Thus whereas in Holland with a population of 5.9 million there were 12 such institutes there was only one central institute for Java and Madoera, with a population of 30 million. The chief reason for the difference is to be found in the large yields from vaccinifiers and the preservation of the lymph obtained points to which NIJLAND paid especial attention. An indication of this yield may be obtained from OTTER's figures of what was required for the whole of the Netherlands Indies with a population of 60 million. These are given as 4-6 rabbits 8-12 cow calves and about 60 buffaloes. A comparatively recent development too is the preparation of a dried vaccine lymph which has high keeping qualities even in a hot tropical climate.

W. F. Harvey

BERNARD (P. Noël) *Le choléra en Indo-Chine et au Extrême-Orient* [Cholera in Indo-China and the Far East].—Arch. Inst. Pasteur d'Indochine 1935 Apr Vol. 6, No. 21 pp. 3-73. With graphs & 2 maps. [114 refs.]

This is a comprehensive review of the position as regards cholera in the East. It extends in its range from British India to Japan and the Philippines and contains many interesting observations.

Cholera may be endemic, and is endemic, in India, Indo-China and China but India is the only part of the world where cholera has existed in a permanent fashion from the remotest times and to the sea form. The emphasis here is evidently not on the endemicity but on the permanence of the presence of cholera as compared with its periodic disappearance in other countries.

In marked contrast to India or more definitely Bengal, we have the three great archipelagoes of Japan, the Philippines and the Netherlands Indies. They are all subject to the menace of cholera and yet Japan and the Netherlands Indies have remained immune, or possibly immune from the disease. In the Philippines epidemics are very frequent and more lasting but there has been notable diminution over the past 12 years. French Indo-China is especially vulnerable to the methods of penetration of cholera—by land and by sea. The conditions too are very favourable for the extension of the disease. So it is not surprising that cholera has also been known in Indo-China from the remotest antiquity. The endemicity of cholera in Indo-China is referred to Cochin-China, Cambodia and Southern Annam. It does not concern Tonking, Northern Annam and Laos. Endemic cholera is liable in these areas to be confused with alimentary diarrhoea and especially the intoxications due to the enterococcus.

What is interesting in the Far East is the success of preventive measures against cholera in the Netherlands Indies and Japan. In the statistics of Japan. In 1902 and 1916 there were 13,502 and 10,271 cases of cholera. In 1917, 1918 and 1919 there were 894, 0 and 237 cases and in 1932, 1933 and 1934 there were 0, 5 and 0 cases. The successful exclusion of cholera in Japan which is monitored by Tokyo and especially by Shanghai, affords the proof that "the same means of defence have given to Japan the same results as to the towns of Europe."

JF A

HERRANZO (Eugenio) *Epidemiological Analysis of the Epidemic of Cholera in the Visayan Region during the Period from 1930 to 1931*.—Monthly Bull. Bureau of Health, Manila. 1933. Dec. Vol. 12 pp. 429-459 & 1934 Jan. Vol. 13 No. 1 pp. 3-27. With 3 maps & 2 graphs.

LOH (Y. T.) & TAI (T. Y.) *A Study of the Blood in Cholera with Special Reference to Urine Analysis*.—Chinese Med. Jl. 1938. May Vol. 56 No. 5 pp. 651-664 [16 refs.]

It is suggested in this study that the administration of large amounts of sodium chloride by intravenous injection may be harmful in cholera patients and increase the gravity of the acidosis and oedema of the later stages of the disease. "If a patient received within two days, say fifteen litres of normal saline, it would mean that he receives 1.35 kgms. of sodium chloride which is an enormous amount even for a patient who had lost part of it through vomiting and diarrhoea. A solution

with lower percentage of sodium chloride is recommended of composition sod. chloride 0.6 or 0.7 per cent. pot. chloride 0.03 per cent calc. chloride 0.025 per cent. and glucose 2.5 per cent. The glucose acts as a diuretic. When desirable 0.5 per cent sod. bicarbonate may be added to counteract the tendency to acidosis. If the substitution of this salt alkali-glucose solution for the ordinary normal salt or hyper tonic solution in the treatment of the dehydration of cholera is proved more beneficial, it is likely to be so in other conditions in which dehydration is a prominently grave condition.

W F H

MUSTAPHA (Ah) Action sur le lait et pouvoir cholérigène du vibron cholérique. [Action upon Milk and Cholera producing Power of the Cholera Vibrio]—*C R Acad Sci* 1936. June 29 Vol 202. No 26 pp 2188-2190

KOCH originally laid stress upon the fact that the cholera vibrio grew well in milk and acidified it without coagulating it. This characteristic of the cholera vibrio has been somewhat neglected and the author has investigated it anew with 64 strains of cholera vibrios—10 from India and 15 from Indo-China which had been isolated in large epidemics 12 from epidemics in Baghdad and Basrah of limited extent and little power of diffusion and 27 of El Tor type. The result was that all but one of the strains from India and Indo-China grew well in milk but did not coagulate it while the vibrios of Baghdad and Basrah derived from feeble epidemics did coagulate it. The ability to coagulate milk attained its maximum in the El Tor vibrios which although apparently true cholera vibrios do not produce cholera. Thus there may be considerable importance attachable to this criterion which seems to distinguish between the epidemic and non-epidemic types of cholera vibrio. The more active the strain in coagulating milk the less is its choleric power.

W F H

WHITE (P Bruce) Observations on the Polysaccharide Complex and Variants of *Vibrio cholerae*—*Brit Jl Experim Path* 1936 June. Vol. 17 No 3 pp 229-234

Detailed evidence is offered by the author in this communication of the views expressed in previous publications (this *Bulletin* 1934 Vol. 31 p 895 1936 Vol. 33 p 374) regarding the polysaccharide structure of vibrios which is the basis of their specificity. The S R and ρ forms of a vibrio represent respectively degrees of degradation of the normal S form by loss of dominant polysaccharide constituents and consequent unmasking of one or other of the remaining polysaccharide elements which becomes dominant in its turn. Four distinct groups of polysaccharide receptors named C α , C β C γ and C δ account for the serological specificity of the normal parent S form and its variants. The S form possesses C α , C β C γ and C δ receptors with C α dominant. The R form C β C γ and C δ with C β dominant and the ρ form C γ and C δ with C δ dominant. This is the thesis presented. No variant degraded below the ρ form has yet been discovered and the polysaccharide substances contained by this form are common in whole or in part to many vibrios. Although the polysaccharide elements of the vibrio have been thus far differentiated it must not be assumed that they are unit substances. They may be internally complex and the characteristic smooth receptors of the Inaba and Ogawa types of *V cholerae*—C α (Inaba) and C α (Ogawa)—are almost certainly so.

A

point of great importance in the recognition of these differential characters in organisms is the preparation and possession of the specific reacting monovalent polysaccharide-precipitating sera. Thus anti-S sera are best prepared by intravenous injection of *S. vibrio*, living or killed at 56°C. over a short period, and anti-C_R sera by injection of *S. vibrios* under the same conditions, while anti-C_P sera have been most obtained by inoculation of rabbits with living *p. vibrio*. No direct and certain method has been found of obtaining a monovalent anti-C_C serum. A monovalent anti-C_C serum can, however, be obtained as in the case with the other monovalent specific sera, by saturation method. In this way C_C serum can be obtained from a mixed C_C-C_P serum by saturation with C_P polysaccharide.

The separation of the C_A, C_B, C_C and C_D factors is a matter best of chemical fractionation methods and the use of the differential action of papain. Thus the digestion of cholera vibrios with papain in tris acid medium will result in solution of the C_A and C_C constituents while the undissolved C_B and C_D can then be obtained from the residue and alkali.

It is not contended that the ultimate fractions of the vibrios are entirely pure substances. They may be contaminated with foreign material. Not only so but the extension of the term "polysaccharide" to the four substances named may possibly be a misnomer. There are two main fractions, I and II obtained in the course of the chemical manipulations and these are—in the case of the cholera vibrio—each derived from S R and *p* forms. The results of precipitation reactions of monovalent anti-S (C_A) anti-R (C_B) anti-*p* (C_D) and anti-*p* (C_D) sera upon fractions I and II with their several specially treated portions form the basis of the argumentation developed in this article.

The application of these methods to the various agglutination types of vibrio has now been begun. It will suffice to say here that the true El Tor vibrio presents a polysaccharide complex serologically identical with that of *V. cholerae* (of the same absorption type); that the C_C and C_D factors seem to be common so far as can be judged by simple precipitation tests to all the types of vibrio so far examined; that different groups of vibrios show sharp differences in the behaviour of their C_B substances and that the C_A substances determine the serological specificity of the various smooth types.

II F II

- i. HELBERG (Borge) *The Biochemical Reactions of Vibrio—II. Hygiene* 1936, Feb. Vol. 36, No. 1 pp. 114-117
- ii. —— *Two Serologically Different Groups among the True Cholera Vibrios*.—*Ibid.* pp. 118-124

1. In the main the first of these two articles is controversial and makes reference to GARDNER and VENKATRAMAN's expression of qualified doubt as to the possibility of an accurate biochemical classification of the vibrio group. According to Helberg it is possible to distinguish six different types of fermentation in vibrios" by the use of only three sugars, mannose, saccharose and arabinose. The most important of his groups, the type I with fermentation manifested in mannose and saccharose but not in arabinose, contained 287 out of 384 test strains of vibrios collected at random. With the exception of the vibrio "Dunbar" all the strains in this group agglutinated with an anti-cholera serum. All the strains however showing a variation in fermentation from this type I that is to say the types II to VI, except

vibrio Dunbar differed from the true cholera vibrios not only serologically but also biochemically. The conclusion therefore to be drawn is that any vibrio not fermenting according to type I has no (or hardly any) O-antigen common to the true classical cholera vibrios (Gardner and Venkatraman O-group I).

The second article treats of a subdivision of true cholera vibrios into a large group with the common factor A alone and a smaller group with one factor more (B) in addition to the common factor A. This separation of groups has been effected by using cross-absorption tests as well as cross-agglutination. Both the antigens A and B are thermostable somatic antigens. This finding may be of importance in epidemiological investigations and in the preparation of vaccines.

W F H

KOROBKOVA (E) Observations ultérieures sur la cytologie des vibrons cholériques [Cytology of the Cholera Vibrio].—*Rev Microbiol Épidémiol et Parasit* 1936 Vol. 15 No 1 [In Russian pp 13-20 With 3 figs. French summary pp 20-22.]

The demonstration of the presence of a nucleus in bacteria has occupied the attention of many workers. Recent researches into variation and microbial dissociation have renewed the interest in this matter. According to the author distinct nuclei can be shown in bacteria but only at a certain stage of development and this stage is very fleeting. Great variation can be observed in cholera vibrios grown in starch media and one of the variations is the production of nucleated forms and also of giant nucleated forms. A good medium to use is one of horse bouillon with 0.5 per cent Witte peptone, 0.5 per cent salt, 1.8 per cent starch and pH 7.8. Cholera vibrios of 5-6 days are sown in this medium, incubated at 38-39°C for 48 hours and maintained at 10-12°C for 48 hours. Such a culture provides beautiful nucleated forms from the 5th day. These nucleated elements are attached to certain colonies of type O which under the action of lytic principle dissociate into S forms. The O stage is only temporary and may be missed. By suitable conditions of cultivation the O phase may be prolonged and nucleated forms obtained with greater regularity.

W F H

AIDA (T) Ueber die im Sommer 1934 in Shanghai als Cholerabacterillus isolierte Vibrio.—*Taiwan Igakka Zasshi* (*Jl Med Assoc Formosa*) 1936 Apr Vol. 35 No 4 (373) [In Japanese pp 768-776 (45 refs.) German summary p 777]

SUGIO (K) & SHIMOMURA (H) The Studies on Agglutination and Agglutinin Absorption Test of *B. cholera*.—*Taiwan Igakka Zasshi* (*Jl Med Assoc Formosa*) 1936 Feb Vol. 35 No 2 (371) [In Japanese pp 518-533 English summary p 534]

Three results emerge from this study of the value of agglutination and absorption tests for the identification of the cholera vibrio. They are that—(1) Cholera vibrios when killed whether by heat or formalin show great variability in specific agglutination reactions whereas these remain definite and constant when living vibrios are used. (2) Vibrios grown on nutrient media of lower pH are more agglutinable and have higher absorptive power than when grown on a more alkaline medium.

although the latter is more favourable to growth itself. (3) The pH of the menstruum in which the vibrios are suspended in agglutination tests, the more rapidly is the reaction completed.

These points should all be taken into consideration in applying the

W.F.B.

SCHOLTENS (R. Th.) Analyse des récepteurs du vibrio cholerae. [Receptors of the Cholera Vibrio.]—*Ann. Inst. Pasteur* 1936 June Vol. 56. No. 6. pp. 710-716.

In a previous work (this *Bulletin* 1936 Vol. 33 p. 378) it was shown that the cholera vibrio possessed two thermostable antigens types A' and B' capable of giving rise to agglutinins A and B. Most strains possess only the receptor A' but a few possess both A' and B'. It is interesting then to determine whether sera possessing only agglutinins and those possessing both A and B reacted in a differential manner. Two amboceptors were concerned, as in the deviation of complement test and also how these sera behaved in absorption tests. Experiments were carried out to this end and the conclusions come to were—(1) The antigen B' and its antibody B do play a part in the reaction of deviation of complement and this action may be even more important than that of A' and A. (2) Strains possessing both A' and B' do not absorb the agglutinin A so well as the strains which have only the receptor A'. (3) It seems advisable to incorporate both antigens A' and B' in anticholera vaccines.

W.F.B.

VASSILADIS (P. Ch.) Action du chloroforme sur les agglutinations flagellaire H et somatique "O" des vibrios, et relations sérologiques de ces antigènes. [Action of Chloroform on Flagellar H and Somatic O Agglutination of Vibrios and Serological Relations of these Antigens.]—*Jl. Egyptian Med. Assoc.* 1936 May Vol. 19 No. 5 pp. 247-283. [21 refs.]

Chloroform is a solvent of fats and it would seem that it dissolves lipid necessary for O agglutination. Its action in the case of H agglutination may be the removal of a lipid inhibiting this type of agglutination. Some of the results obtained by the author were—(1) Chloroform extraction considerably reduces the O agglutinability of vibrios by specific serum. (2) The thermostable antigen O, which is rendered almost non-agglutinable by chloroform, is not destroyed, for it is still capable of acting as antigen in animal injection and also in absorption of O agglutinin. (3) Chloroform extraction considerably increases the H agglutinability of vibrios and may even cause an H agglutination in non-agglutinable vibrios. (4) Mutations of agglutinability were observed in three vibrios El-Tor of 1935. (5) Two vibrios non-agglutinable at the time of their isolation at El-Tor in 1935, became agglutinable later.

W.F.B.

VASSILADIS (P. Ch.) Modifications de l'agglutination somatique "O" et flagellaire H des vibrios après traitement par le chloroforme. [Modification of Somatic O and Flagellar H Agglutination of Vibrios by Chloroform.]—*C. R. Soc. Biol.* 1936 Vol. 127 No. 11 pp. 1069-1071.

Extraction of vibrios by chloroform (1) lowers considerably their somatic O agglutinability (2) increases very markedly the H flagellar

agglutinability of cholera vibrios (3) causes to appear a flagellar H agglutinability of considerable titre in vibrios which are not agglutinable as such by HO anticholera serum.

W F H

YANG (Y N.) TSOAO (S L.) CHANG (Y) & CHUNO (C Y) The Bactericidal Action and Agglutinin Response of Persons Inoculated with Typhoid and Cholera Vaccines —*Chinese Med Jl* 1936 Feb Supp No 1 pp 202-212.

GHOOSH (H) Further Investigation of a New Anti-Cholera Serum — *Brit Med Jl* 1936 May 9 pp 936-938

In this modification of the author's original method a much larger quantity of seed culture is used for inoculation of the special broth than in the case of manufacture of the original toxin (this *Bulletin* 1933 Vol. 30 p 538). The toxin obtained is used to immunize serum horses. In the trials now made only whole immune serum was given in one intraperitoneal dose of 70 to 80 cc diluted with 200 cc warm salt solution instead of concentrated serum as on the previous occasion (this *Bulletin* 1935 Vol. 32 p 459). Altogether 47 cases were treated with a mortality of 10.63 per cent. as against 170 control cases treated by other methods with a mortality of 20.5 per cent. Uraemia it is noted was absent in the serum treated cases and this is regarded as an indication of the neutralizing effect of the serum on the toxin which could not therefore cause any further damage to the kidney. Tympanitis too was rarely observed. Only two patients out of the 47 showed a mild urticaria.

W F H

PASRICHA (C L.) DE MONTE (A. J. H.) & GUPTA (S K.) A New Type of Cholerophage—Type M.—*Indian Med Gaz* 1936 Apr Vol. 71 No 4 pp 194-196 With 1 fig

The addition of a twelfth type of cholerophage to those already existing is made by the authors an occasion for very interesting remarks on the cholerophage question. A new cholerophage type M has been isolated which is slow acting gives an incomplete lysis in liquid medium acts on both rough and smooth vibrios and has a very wide range of activity. All types of cholerophage possess one common characteristic in that they have reciprocal action the secondary culture obtained after the action of any one type is lysable by the remaining types of choleraphages. All of these phages act on ultra pure cholera vibrios but vary in the effects they produce singly or combined. Perhaps the most interesting of these phages is the type A which acts only on agglutinable vibrios possessing a considerable amount of smooth element. Again type A antiphage serum inhibits only type A cholerophage whereas the other types appear to be related serologically. All the other cholerophage types B to M lyse a certain number of inagglutinable vibrios. Transformation of vibrios from one strain to another or even one species to another is a subject of constant controversy. This subject is closely related to the phage question for alteration of the antigenic structure of an organism as of smooth to rough or the reverse and of agglutinable to inagglutinable can be brought about by phage action. Pasricha and his co-workers have dealt also with vibriophages in general as distinct from purely choleraphages. This distinction is made by defining vibriophages as those which are active on inagglutinable vibrios and which if active on inagglutinable

vibrios do not give the reciprocal cross test." Under the influence of certain vibriophages some strains of haemagglutinable vibrios become agglutinable and indistinguishable from true cholera vibrios. This is certain that in the present-day studies of vibrios special attention must be paid to the rôle of the cholera-phage and the bacteriophage in effecting what seems to be a transmutation. W. F. B.

PASRICHA (C. L.) DE MOORE (A. J. H.) & O'FLYNN (E. G.). Bacteriophage in the Treatment of Cholera.—*Indian Med. Gaz.* 73, Feb. Vol. 71 No. 2, pp. 61-68. With 1 graph. [18 mb.]

A serious and very commendable attempt has been made, by the authors of the trials here described, to assess the therapeutic value of bacteriophage in cholera on an alternate case basis. The course of the fatal issue which has the advantage of being definite and incontrovertible is the one employed. An immediate difference is apparent between the old mortality statistics of 8.1 per cent. for the phage-treated cases and 62.9 per cent. for the untreated and the present series. In this present series 1,369 cases of cholera were admitted to hospital. Of these 684 cases were treated with specially prepared cholera-phage and 685 were not treated with cholera-phage. The division into two groups was made by admitting patients alternately into two separate wards. The mortality figures now became 13.5 per cent. for the phage-treated and 18.8 per cent. for the non-treated. It is admitted that the results have not been dramatic and that the authors

have not met with the striking results obtained by some of the previous workers. "No analysis has been attempted of the age distribution or severity distribution in the two groups of trial cases on admission to hospital but some analysis has been made of the course of the disease as it evolved. This latter analysis has tended to accentuate the value of treatment by phage in modifying the course of cholera favourably. Other analyses are of the presence of agglutinable vibrios or haemagglutinable vibrios in the stools and the absence of vibrios. The mortality figures show up much more favourable, between treated and untreated when agglutinable vibrios only are found. One difficulty or rather supposition, is mentioned as relating against the strictly alternate character of the groups involved and that is the possibility of spread of bacteriophage from the ward of untreated cases to the ward of treated cases. Thus it has always been maintained by D'HERELLE, vitiates all such trials. An interesting fact is also brought out which not being easily explainable, is meanwhile left out of account. This was that the relative mortality rates as between phage-treated and non-treated are reversed altogether when only haemagglutinable or no vibrios were isolated, for now it is the non-phage treated patients who show more favourable results. Nevertheless there was no reason to suppose that cases in which no vibrios could be found were not cholera cases.

All circumstances having been taken into account, the authors reach a well argued conclusion from a scientifically planned trial that they say — Comparison of the results of the experiment, taking recovery or death as the sole criterion of the value of cholera-phage, shows that bacteriophage has caused a real reduction in cholera mortality in cases passing vibrios and that this reduction is not marked in those cases passing agglutinable vibrios." W. F. B.

RAYNAL (J.) Rapport de mission aux Indes Anglaises relative à l'étude des bactériophages appliqués à la prévention du choléra (Août Septembre 1933) [Report on the Mission to British India for the Study of Bacteriophages Prophylaxis against Cholera]—*Arch Inst Pasteur d'Indochine* 1935 Apr Vol. 6 No 21 pp 77-126 With 1 map & 15 figs. [Refs. in footnotes.]

The mission referred to here had as its object the study at the bacteriological laboratory of Shillong of the technique of preparation of bacteriophages and their application to the prevention of cholera. The report is very full on the subject of technique and non-committal on the subject of claims for success of bacteriophage prophylaxis or therapy (see this *Bulletin* 1935 Vol. 32 p 460) W F H

DZEN (M. Y.) & YU (H.) The Optimum Dosage of Prophylactic Cholera Vaccine—*Chinese Med Jl* 1936 Feb Supp No 1 pp 198-201

Arrangements for mass prophylactic inoculation with any vaccine may demand a special procedure. In the case of the municipalities of Shanghai and other centres in China it has not as a rule been possible to administer more than a single dose. This and the fact that the immunity induced is short lived constitute the difficulties of the situation. At the same time the dangerous season for cholera epidemics in China is a short one and confined to a few weeks during the summer season. Thus it becomes important to determine the single optimum dose of vaccine which will be most effective under these circumstances. The authors realized that actual protection tests were even better than agglutination response for this purpose and used very considerable numbers of guineapigs in their experiments. These experiments involved injection of the prophylactic subcutaneously and a testing dose two weeks later of 5 cc. of a 16-hour broth culture of *V cholerae*. They obtained, for concentrations of sterilized vaccine of 2 000 4 000 and 8 000 million per cc and the use of 124 42 and 122 guineapigs respectively percentage mortalities of 41.94 22.50 and 20.49. The control group of unvaccinated guineapigs 75 in number gave a mortality of 68.63 per cent. It was therefore evident that the more highly concentrated vaccine is undoubtedly the most effective. A further experiment with a system of vaccination by two injections of 1 cc. each containing 2 000 million organisms gave only one death out of 42 guineapigs. The conclusions drawn are that (1) where possible two injections are better than one and (2) if only one is possible the concentration should be raised from 2,000 million to 4 000 or 8 000 per cc. W F H

TEWARI (M.) A Secondary Reaction after Anti-Cholera Inoculation. [Correspondence.]—*Lancet* 1936 Mar 7 p 572.

— Late Reactions after Anti-Cholera Inoculation. [Correspondence.]—*Indian Med Gaz* 1936 Apr Vol 71 No 4 p 242.

This is a record and a request for an explanation of the occurrence of a secondary reaction to inoculation of cholera vaccine. It occurred in about 8 to 10 per cent. of persons inoculated on the 12th to 14th day and took the form of localized redness pain and tenderness with rise of temperature. As a reaction it was milder than the primary.

W F H

PLAQUE.

QUARTERLY BULLETIN OF THE HEALTH ORGANISATION, LEAGUE OF NATIONS, Geneva, 1938 Mar Vol. 5 No. 1 pp. 89-98

—Plague. [Report of Committee on Plague and Resolution of Pan-African Health Conference Johannesburg, Nov 20-30, 1935, pp. 89-93] THORNTON (Edward V.) Position in Beaufort West in Plague in the Union of South Africa [Annex I, pp. 98-102] GIRARD (G.) The Plague in Madagascar and the New Knowledge gained from Research during the Last Three Years [Annex II pp. 103-107] RIBEIRO (L.) Developments in Endemic Plague in Angola from 1932 onwards [Annex III, pp. 108-109].

I Points of interest and importance taken from this report are —
 (1) In the Union of South Africa and countries grouped immediately to the north and west of it the incidence of human plague is determined by the epizootic among wild rodents, infection being in great part direct from wild rodents and to a less extent from domestic rats infected by fleas from wild rodents." (2) In the more northern territories there is evidence of an increasing importance of the domestic cat. Epizootics may have been in progress for some time before they were discovered. It is manifest that close observation of the habits of wild rodents and of the clues which afford evidence that an unusual death rate is occurring, is necessary if early discovery of the epizootic is to be made. (4) Resolutions were adopted —

(a) "That the best practical policy for towns is to concentrate on the systematic building out of rats, and to supplement it by effective rodent destruction, plus the creation of deep rodent-free belts around boundaries, rather than to rely on such measures as mass prophylactic inoculation. (b) That in countries where spread is mainly by wild rodents, the setting up and maintenance of barriers by gassing, poisoning and trapping plus an attack on domestic rodents, is strongly to be recommended in every case. (c) That, in countries where the domestic rodent problem is an important factor and where it defies control, prophylactic measures may have to be undertaken in addition to such anti-rodent measures as are practicable."

II Salient points regarding the history of plague in South Africa are well summarized as follows —

(1) From 1892 to 1905 plague was introduced at the ports and caused extensive outbreaks amongst domestic rodents and a considerable number of human cases in urban areas before it was eradicated from those areas. (2) From 1903 to 1905 striped mice (*Rhabdomys pumilio*) in the bush surrounding one or more of the ports became infected and the infection spread slowly through the bush until it reached in 1914 sandy coastal island, where gerbilles were plentiful, when rapid spread all over the island parts of the Union with isolated human cases occurred. (3) During the period 1914-1933 human cases were almost entirely infected from wild rodents and domestic rodents were found infected in exceptional cases only. (4) During 1934-35 with the breeding up of wild rodents owing to favourable seasons numerous waves of infections occurred resulting in an increased number of human cases. Further, domestic rodents became infected in a considerable number of places. (5) The indications for the coming season are that cases of plague will again show an increase, owing to the fact that gerbil colonies have again multiplied enormously in the neighbourhood of former foci.

III The position in Madagascar differs from that in South Africa, for there is no evidence here suggesting that wild rodents are concerned

in the transmission of plague to the rat or that they are a reservoir of plague. The rat constitutes the animal reservoir which keeps the disease going. And yet it is the bush land of the high plateaux which furnished the greater number of plague cases. The chief plague problem is a rural one. Another point of importance which has been emphasized is that *X. cheopis* the rat flea is quite frequently found free of the rat in the dust of native houses especially in the dark corners where temperature and humidity are constant. Moreover fleas have been shown to be plague infected in huts in which a case of human plague occurred and in which no rats could be found. A new plague-carrying flea *Synopsylla sonorensis* has been identified on rats of the high plateaux but only in the outside burrows. Where *X. cheopis* never occurs.

In Madagascar a living attenuated plague vaccine has been used in man on a large scale. It is claimed that by its use the death rate from plague has been reduced by two-thirds and the general death rate from all causes by 50 per cent.

The possibilities of serum therapy have also received attention and the same living attenuated plague strain has been used, up to large doses for the inoculation of the horses which provide immune plague serum. Doses are reckoned of two full Roux flasks of culture by intravenous injection.

IV This is a short report dealing with the endemic manifestations of plague in Angola which have occurred since the end of 1932.

IV F Harvey

THORNTON (E N) Plague—Rep Dept Public Health South Africa 1934-35 pp 29-34 1935 Pretoria. [Summarized in Rep Applied Environ Ser B 1936 Apr Vol. 24 Pt 4 pp 76-77]

An epizootic of plague occurred among veldt rodents and in certain localities the incidence in man was high. Owing to the large amount of rat proofing that has been carried out urban centres were little affected. In the Orange Free State where the disease was most prevalent the summer of 1933-34 had been particularly favourable for the growth of the grasses on the seeds of which gerbilles feed and an enormous increase occurred among these rodents. In November 1934 waves of plague were reported to be destroying them and the likelihood of domestic rodents becoming infected and so bringing about the infection of man was forecast. The incidence in man was highest in the south-western part of the Orange Free State where the Namaqua gerbille [*Dendromus auricularis*] is abundant and the lobengula gerbille [*Tatera lobengulae*] is also found. The relative freedom of the northern part of the State may be attributed to the extensive destruction of veldt rodents in that area during the previous epizootic. The number of farms infected was very small compared to the extent of the epizootic and this was probably due to the relative freedom of domestic rodents from infection. The chief intermediary between the gerbilles and man was the multimammate mouse [*Maxomys coucha*] although in a few instances *Viverrus (Rattus) rattus* was also involved. The floors of huts that could not be economically fumigated were dusted with calcium cyanide (cyanodust) and subsequently flamed with a blow lamp. Calcium cyanide in the form of calcid briquettes applied to rodent burrows by means of a rotary duster gave promising results.

TSURUMI (S.L.) L'épidémie de peste du Mandchoukouo en 1934 [Epidemic Plague in Manchukuo in 1934].—Bull Office Internat Hyg Publique 1934, Feb., Vol. 23, No. 2, pp. 253-254

Two regions were involved in this epidemic Nungan and the river line. A total of 888 cases of plague was distributed over 94 villages which was about half the number of the previous year. The disease was entirely bubonic in form, while septicaemia and pneumonic were secondary. Not one of the 45,464 rats examined bacteriologically was found to be plague infected but in 36 cases a plague-like bacillus was found in the rodent *Citellus mongolicus russicus* Thomas. This rodent is considered as probably responsible for the propagation of plague in Mongolia and Manchuria.

JF&H

PAREIRAS (Decso). Notas e estudos sobre a peste no nordeste do Brasil, problema nacional.—Bol. Oficina Sanitária Panamericana 1934 May Vol. 15 No. 5 pp. 429-433.

WU LIEN TEH CHUW (J. W. H.) POLITZER (R.) & WU (C. T.). Plague—a Manual for Medical and Public Health Workers.

This book was reviewed on p. 726.

GRAY (J. C. P.) The Control of Plague in Java.—Malaya Vol. 1, 1936 June Vol. 11 No. 2 pp. 115-116.

The views of an outside observer on the important special measures of plague control which have been adopted in thickly populated Java are particularly valuable. Measures which have been tried and found are isolation, fumigation, rat poisoning, prophylactic vaccine. Stress is now laid on the improvement of the houses of the people who live in the country districts with a view to breaking down "the close association between man and rat." That association is not so close in the towns. The officers of the Plague Control Service themselves take no particular precautions against the disease, "as it is considered that they are only at any appreciable risk in the course of their work, if they happen to live and sleep (especially on bamboo beds) in the epidemic area."

The Javan house is built of bamboo posts, thatch (attap) roofs and is double walled. Improvement of such a house consists in replacing bamboo—including the bamboo of beds—with timber, the roof with tiles and closing the double space between the walls. When this is done the rats leave the houses "for more congenial breeding places." Unfortunately the process of improvement of the dwelling house is costly and the people are poor. Government loans are needed and are given to the householder. It is the owner who dismantles his old house and reconstructs it with the help and advice of the officers. The reconstructed houses are inspected, passed and again re-inspected at intervals "to ensure they are properly maintained." The success of these measures is evident. Plague started in East Java, spread to Mid Java and is now in West Java. Reconstruction of houses automatically followed the same course. It can be shown that East Java is now practically free of plague, plague is disappearing from Central Java and the same thing is happening in those parts of Western Java where the kampongs have been reconstructed. With the reconstruction the houses become brighter and cleaner the populace likewise seems to reflect in their lives thus brightening up of their homes.

JF&H

FOURIE (L.) Field Work against Plague—*Proc Transvaal Med Officers Assoc* 1936 Jan. Vol. 15 No. 171 pp 43-58
With 24 figs

The observations recorded in this paper have reference largely to the epidemiology of plague in the Eastern Cape Province Orange Free State and Transvaal. Most of the human outbreaks have been restricted to the country districts and have affected natives much more than Europeans. They have been associated with mortality among domestic rodents resulting from an epizootic among gerbilles with the multimammate mouse *Mastomys coucha* as the only agent of transmission from gerbilles to man. Although all the small indigenous species are susceptible to plague it is only the gerbille and the multi mammate mouse which are important in the spread of plague. Two members of the gerbille family *Taterona* and *Desmodillus* are those concerned. The multimammate mouse is not an active animal and does not burrow to any great extent. It has acquired the habit of freely entering and taking up its abode specially in native dwellings and in outhouses but is very seldom carried in farm produce. Being essentially a wild rodent it is not found in towns but only on their outskirts. Thus it can be understood why outbreaks occur in farms and affect mostly natives but do not occur in towns and villages. Human plague in towns is due rather to accidental infection by rats. It would be a disaster if plague spread to the rats in the Reef mines and became enzootic among them.

An intimate knowledge of the habits and behaviour of the gerbille is required for the early detection of the prevalence of a plague epizootic among them.

W F H

MEYER (K. F.) & EDDIE (B.) Selvatic Plague in California. Discussion of its Extant in the Years 1934 and 1935.—Reprinted from *California & Western Med* 1935 Dec Vol. 43 No. 6 18 pp [15 refs]

Much useful commentary and discussion of selvatic plague or as the authors insist it should be called sylvatic plague is contained in this pamphlet. The points raised are deserving of close attention and study. It has to be realized that in the Pacific States of the Union wild rodents play the most important rôle as reservoirs of the disease. Only two (possibly three) human cases of plague have been recognized in 1934 and none in 1935. At intervals however epidemics have appeared among one or other of the wild rodents found in certain counties and it is now probable that this undue mortality has been a plague mortality. Such epidemics among squirrels and wild rabbits have previously been too readily ascribed to tularaemia and therefore not to have required systematic investigation. It is now known of course that many other rodents than the rat and mouse suffer from spontaneous plague. In South Africa nineteen different rodents have been found to be spontaneously plague infected. Sylvatic plague with all its possibilities has become of the greatest importance and may at any time become a grave danger to man. Thus sylvatic plague has crossed the Pacific States and has appeared in the Rocky Mountain States. How far it has travelled in an easterly direction has not as yet been determined.

Two important observations are placed on record by the authors one as to the fact that chronic latent plague may occur in man and the other as to the probability that the mapparent plague or a *B. pestis*

infection without visible lesions" which has been established for the rat the suslik and the turbagan may occur in the Oregon species. The physiological inactivity of these animals during hibernation may be an important factor in the determination of latency of a plague infection.

It is evident from this and other similar studies that the widespread existence of sylvatic plague demands careful investigation of the rodent species involved, their habits of life their migrations their hibernation, their ectoparasites and their natural enemies. The serum reactions of rodents may furnish valuable information as also may experiments to determine the comparative susceptibility of the various species.
[See this Bulletin 1934 Vol. 31 p. 878.]

W F B.

FEXJUK (B) & DEMJASHEV (M). Studies on the Migrations of Gerbils by Means of Banding Method.—*Rev. Microbiol. Epidemiol. et Parasit.* 1936 Vol. 15 No. 1 [In Russian pp. 89-106. With 8 figs. 37 refs. English summary pp. 107-108.]

An attempt was made to determine how far gerbils migrate from their burrows. This was done by catching the animals, marking them, setting them free and recatching them. Out of a total of 1,361 gerbils 210 with marks were caught. It was established that they might wander to a distance of 100 metres from their burrows for feeding purposes and that the track left by an animal in snow or sand might extend in 24 hours to as much as one kilometre.

W F B.

KALABELOV (A) & RAEVSKY (M). The Life Cycle of the Great Squirrel (*Citellus pygmaeus* Pall.) and the Laws of Development of the Plague Epizootia. IV Ecological Peculiarities of the Great Squirrel at the Different Periods of its Yearly Life Cycle.—*Rev. Microbiol. Epidemiol. et Parasit.* 1936 Vol. 15 No. 1 [In Russian pp. 109-129. With 7 figs. 14 refs. English summary p. 130.]

When newly born squirrels appear above ground and disperse they come to occupy fresh burrows some inhabited and some deserted. By their occupation of an old burrow the young animals may become infected through fleas left behind in nests where ground squirrels had died in an epizootic of the previous year. This dispersion of young animals therefore is the principal cause of annual epizootic outbreaks and it will occur earlier or later in spring according to the climatic conditions of the locality. During the summer ground squirrels move only to short distances of a few hundred metres but the annual dispersion of young animals may lead to their travelling as much as 2-5 kilometres.

W F B.

TOMASSEK (V. M.). Ueber den Beginn spontaner Pestepizootien unter Zieseln, *Citellus pygmaeus* Pall. und ihren Verket. [On the Beginning of Spontaneous Plague Epizooties among Squirrels and their Course.]—*Rev. Microbiol. Epidemiol. et Parasit.* 1936 Vol. 14 No. 4 [In Russian pp. 419-424 German summary p. 424.]

It is generally accepted that plague epizootics among squirrels, *Citellus pygmaeus* Pall. begin at the time of migration of the young animals. These observations tend to show however that nests may become infected soon after their awakening from winter sleep and, apparently

at the time of mating. There is reason to believe that the early spring epizootics do not last long owing to the short duration of the mating season after which these animals betake themselves to an individual mode of life. The epizootic is extinguished only to light up again on the second occasion of contact which is the migration period of the young animals. At this time the epizootic is of longer duration and lasts up to the time of hibernation.

W F H

BUXTON (P. A.) Breeding Rates of Domestic Rats trapped in Lagos, Nigeria, and Certain Other Countries—Reprinted from *Jl Animal Ecology* 1936 May Vol 5 No 1 pp 53-66 With 2 figs [23 refs.]

Increased attention is at the present time being paid to biological data among the animals capable of transmitting disease to man. The usefulness of such data has been abundantly proved for wild rodents and forms the basis of rational preventive measures and epidemiology. In this article a strong case is made out for more careful investigation of the domestic rodent and its fertility is the main subject of discussion. A careful analysis of data already accumulated shows that there is a seasonal rhythm for pregnancies in every country for which the figures are available. Generally speaking the breeding season appears to coincide with the warm season in temperate and subtropical climates. But it appears that in places which have a monsoon the relation between climate and breeding is not so simple. It seems probable that breeding is largely a matter of nutrition that may well depend on harvests and indirectly on climatic events.

Due and proper emphasis is laid in the discussion upon the statistical pitfall of selection for the collector of field data. The samples taken may not be truly random and the deductions based upon them may lead to wholly erroneous ideas on the existing sex ratios or figures about pregnancy or the abundance of young rats. Young rats are more easy to trap than old ones and trapping may also be selective in respect of sex. Dilution is also the source of much error in many statistical findings. The amount of breeding which is going on may for example be obscured by the incursion of a large population of new born animals none of which is yet ready to breed. These will nevertheless dilute the totals on which percentages are calculated. Some standardization at least of age would be required to avoid the dilution of the new born. In fact the usual statistical presentations of age sex and other distributions with controls ought to accompany all field and laboratory data. These data too are apt to be meagre in other respects. Even the information which is available is not always utilized we may have given us only an average figure or percentage or at most these along with a maximum and minimum instead of the much more useful frequency distribution mean range and standard deviation. Types of card for the booking of data derived from each captured rat are given which might well be made use of as standard by the plague worker.

W F H

BOVENBARKER (A.) Over pest Symptomen verpleging en behandeling [Plague Symptoms, Nursing and Treatment]—*Geneesk Tijdschr v Nederl Indië* 1936 June 9 Vol. 76 No 23 pp 1410-1423

As this is a clinical lecture much of it is taken up with the description of two cases of plague. Clinically plague may be difficult to

distinguish from typhus. In plague a marked leucocytosis, which may reach 50,000 or over with a shift to the left, is of some value in doubtful cases. It is the blood culture, however, and especially the preliminary culture in bile, which is a great standby for diagnosis. It seldom fails. Of the complications of plague the most important are those affecting the lungs—bronchitis, bronchopneumonia and lobar pneumonia. Pneumonias both in bubonic and septicemic plague, can make a sudden appearance a matter of considerable importance in the history of plague cases. Other complications are conjunctivitis—which can lead to keratitis, endocycitis and hypopyon-carbonades and other pustular conditions. Among the less frequent complications are paralyses meningitis-like symptoms, arthritis, diarrhoea and jaundice.

The nursing staff in attendance on plague cases should wear a sept mouth and nose mask of 4-fold gauze. It should also be a practice, in feeding a patient to stand well behind him.

Treatment of plague is largely symptomatic. The author has used bacteriophage daily by intravenous injection and, in the case of bubo plague, has injected 2 cc. on 4 to 5 consecutive days into the bila. His impression is that this treatment was advantageous.

W F E

LE GALL, SEYBERLICH & BRAULT. *Peste septique à éruption anormale guérison.* [Abnormal Plague Septicaemia. Case.] Bull Soc Path Exot. 1936. Mar 11. Vol. 29. No. 1 pp. 351-353.

On admission to hospital the patient, whose daughter was already in hospital with bubonic plague, had a temperature of 38.5°C. On the next day his complaint was of some dyspepsia, a swollen and painful abdomen, violent headache and muscular pain in the lower limbs. His temperature was 39.2°C. his general condition excellent and there was no evidence of lymph node involvement. An examination of the blood showed malarial parasites. Treatment by quinine produced improvement. A blood culture carried out on the third day gave a positive result for plague, which was fully confirmed by animal inoculation. Treatment consisted of a daily subcutaneous inoculation of antiplague serum and a fixation abscess. The serum treatment continued until the 13th day and the patient received altogether 320 cc. Recovery took place, which is an exceptional result but a record for septicemic plague. In the discussion which followed it was pointed out that, even if delicate bacteriological tests were capable of demonstrating the presence of some bacilli in the blood, this did not mean a septicaemia in which the organisms were growing freely in the blood, as is the case in anthrax or in the terminal phase of plague. A few germs can be present in the blood without constituting a breakdown in the defence of the body. It is demonstrable, for example, in diseases like typhoid, pneumonia and tuberculosis.

W F E

JOLTRAIS (E.) *Cas de peste bénigne observé dans la région péruvienne.* Difficultés du diagnostic.—Bull Acad. M. Roumaine. Path. 1936 Vol. 1 No. 3. pp. 339-349

BODET (H.) *Note sur un cas de charbon pestieux.*—Bull Soc. Path. Exot. 1936 Mar 11 Vol. 29 No. 3 pp. 345-346.

MADISON (R. R.) Fibrinolytic Specificity of *B. pestis*—Proc Soc Experim Biol & Med 1936 Apr Vol. 34 No 3 pp. 301-302.

With a plasma blood clot test it had been found that only streptococci and staphylococci produced a fibrinolytic enzyme. As however a negative result of test may be due to the presence in a plasma clot of neutralizing bodies the present investigation was carried through with a serum free fibrin-clot technique. It has been found that in addition to certain pyogenic cocci all locally available strains of *B. pestis* are strongly fibrinolytic particularly when tested with rat or guinea pig fibrin.

W F H

FADDEEVA (T) & TSCHERNOBAEW (W) *Bacillus pestis* in Mixed Culture. I. The Antagonism of Different Species of Bacteria relatively [to the growth of] *B. pestis*—Rev Microbiol Epidemiol & Parasit. 1935 Vol. 14 No 4 [In Russian pp 346-356 With 9 figs. on 2 plates. English summary pp 357-358.]

A number of organisms have been examined in regard to their behaviour towards the growth of *Pest. pestis*. Some are antagonistic and some tend to grow in symbiosis. Among the antagonistic organisms are found *Streptococcus mucosus* the pneumococcus nearly all the typho-cob group *Bac. faecalis alkaligenes* one strain of *Cromobact. prodigiosum* one strain of *Ps. syringae* *V. cholerae* and *B. mordetii*. Of the organisms which could grow in symbiosis may be mentioned *Sarcina* *Staphylococcus aureus* *V. parahaemolyticus* *Bac. escherichia* *Bac. aromaticum* and *B. subtilis*. Dysentery organisms seem to divide themselves between the two groups nor does the grouping appear to proceed on very well defined generic lines.

W F H

SANDROW (Th.) Ueber den Einfluss einiger Histolyse auf das Wachstum des *B. pestis* [The Influence of some Organ Lyses on the Growth of *Pest. pestis*]—Rev Microbiol Epidemiol & Parasit 1935 Vol. 14 No 4 [In Russian pp 359-364 With 5 figs German summary pp 364-365]

Lyses were prepared from liver and spleen which contained (a) peptone, (b) peptone and traces of desterocalbumoses (c) aburetic products. One of these was added to Martin's agar in concentrations varying from 1-100 to 1-1 000 000. In the small concentrations the quality of the agar was distinctly improved for growth of *Pest. pestis* which could also be grown from a weak suspension such as gave no growth at all on ordinary agar. The modified agar was capable of being heated and cooled without affecting its nutrient quality and could be preserved for 3 months.

W F H

MORALES OTERO (P.) The Bacteriology of Plague A Review—Puerto Rico Jl Public Health & Trop Med 1936 Mar Vol. 11 No 3 pp 533-583 [83 refs] [Spanish version pp 584-618]

DEVICHEAT (R.) Note sur une méthode pratique de recherche de l'infection pesteuse chez les rongeurs.—Ann Soc Belge de Med Trop 1936 Mar 31 Vol. 16 No 1 pp 43-45

POKROVSKAJA (M) Leber prophylaktische Impfungen gegen Pest [Prophylactic Inoculation against Plague with Avirulent Live Organisms]. — *Riv Microbiol., Epidémiol et Parasit.* 1933, Vol. 14, No. 4. [In Russian pp. 378-385. With 1 chart. (With German summary, pp. 385-386.)]

An avirulent culture of the plague bacillus was obtained as a result from the action of bacteriophage on a virulent strain. This culture was tested for its immunizing properties on mice and guinea-pigs and gave mortality rates of 10 or 11 per cent. in the inoculated animals against 80 or 100 per cent. in the controls. W. F. E.

SOKHRE (S. S.) with the technical collaboration of H. MARCOU. Un nouveau sérum antipesteux. [A New Antiplague Serum]. — *Office International d'Hyg. Publique* 1938, June, Vol. 21, No. 6, pp. 1097-1100

The new antiplague serum is obtained by the immunization of horses. To begin with the horses are inoculated intravenously with avirulent cultures and later with virulent cultures and filtrates of cultures 4 weeks in bouillon grown at 27°C. A special method of testing the efficacy of the serum is used and is based on the author's quantitative method of standardization of plague antigen (this Bulletin 1936, Vol. 11, p. 367). It consists of using graduated doses of the test serum and injecting each of these doses into a group of 5 mice of about 3 weeks age. The mice receive subcutaneously on the other side the standard infecting dose of plague bacilli 0.5 cc. 1-1,000,000 dilution of a 5% bouillon plague culture of standard virulence. That dose which saves more than half of the animals injected is taken to be the protective dose. By this method of measurement the protective dose in cc. was found to be —new serum 0.05 buffalo serum of 1/100 Pasteur Institute serum 0.5 and Lister Institute serum 6. In previous trials of plague serum therapeutically it had been found that once bacillaemia was established, it was quite ineffective. In order to test this point for the new serum a technique has been devised, based on the observation that mice receiving subcutaneously the standard infecting dose developed bacillaemia in about 72 hours with 100 per cent mortality in 5 to 9 days. Such mice commencing treatment at 72 hours with 0.9 cc. new serum subcutaneously given in 3 daily doses of 0.3 cc. each, showed a saving of 70 to 80 per cent. of the test animals. A small series of human cases gave 3 deaths out of 17 for the new serum and 13 deaths out of 17 controls. W. F. E.

IWAJOWSKI (A) & FADDEEVA (T). Einwirkung des Chloroform auf das Antipestserum. [Action of Chloroform on Antiplague Serum]. — *Riv Microbiol. Epidémiol et Parasit.* 1933, Vol. 14, No. 4. [In Russian pp. 404-409. With 2 figs. (10 refs.) German summary p. 410.]

The action of chloroform on the protein constituents of antiplague sera was determined by shaking the two up together. The following conclusions are drawn —(1) Precipitation mainly of the globulin fraction takes place. (2) The rate of precipitation depends on the amount of chloroform added and the duration of the shaking. (3) The precipitation brought about by shaking with chloroform is an adsorption phenomenon and is correlated with the presence of antibodies.

substances. (4) In the process the titre of the antibodies agglutinins and precipitins diminishes at a rate which is parallel to the loss of globulin.

W F H

SOUKNEV (V.) JOUKOW WEREJEWIKOW (N.) FAVORISSOWA (B.) & KASANZHEVA (E.) Combined Treatment of Plague with Bacteriophage and Envelope Parts and Nucleoprotein Anti-Sera.—*Revue Microbiol Epidemiol et Parasit* 1935 Vol 14 No 4 [In Russian pp 387-392 [12 refs.] English summary p 392.]

In these experiments the various sera were injected simultaneously with the testing dose of plague bacilli. The Paris serum obtained by immunization of horses with living plague organisms prolonged the life of test animals on the average to 23.67 days, the nucleoprotein serum to 7.6 days, the anti-envelope serum to 9.4 days and the bacteriophage to 4 days. Control animals lived for 4 days. The best results were obtained by combining bacteriophage with an antiserum where the former acts as a vaccine under the protection of the passive immunity given by the latter.

W F H

KRAUCHI (K.) & HOHN (H.) Nouveau vaccin antipesteux purifié et concentré et tirage de son efficacité. Recherches sur la fraction antigène spécifique du bacille de la peste. New Concentrated Plague Vaccine Its Efficacy Specific Antigenic Fraction of the Plague Bacillus—*Bull Office Internat d'Hyg Publique* 1936 June Vol 23 No 6 pp 1088-1096

According to the authors of this note the plague bacillus contains two independent antigens one of which is contained in the capsule and the other in the body of the organism. It is the antigen of the capsule which is specific and efficacious in producing immunity (S.I.F. or "specific immunizing fraction"). The antigenic protein of the body is not efficacious and only contributes to producing an unwanted reaction. If immunization with a single dose is desired it is necessary to use the S.I.F. solution absorbed by metallic salts and in the form of an emulsion. Used in this way the vaccine develops less secondary reaction because absorption is slowed. Titration of a test S.I.F. vaccine is effected by means of a comparison with the flocculation occurring between a standard dried solution of S.I.F. and the homologous anti-serum. One unit of this vaccine signifies the quantity of S.I.F. corresponding to 1 mgm. of bacillary substance cultivated at 37°C. and about 20 units are sufficient for immunization in man.

W F H

GIRARD (G.) & ROVIC (J.) La vaccination de l'homme contre la peste au moyen de bacilles vivants (virus vaccin E.V.) Son application à Madagascar [Plague Vaccination of Man with Living Bacilli]—*Bull Office Internat d'Hyg Publique* 1936 June Vol 28 No 6 pp 1077-1087

Notices of the use of E.V. vaccine have appeared in this Bulletin (1935 Vol 32 p 850 and 1936 Vol 33 p 366). The strain used in preparation is avirulent for the guinea pig and rabbit by subcutaneous and other injection. Intraperitoneally it may be lethal in large doses. All guinea pigs vaccinated with this living strain have withstand severe tests corresponding to thousands of fatal doses and to the infected *X. cholerae* which killed a control guinea pig in 5 days.

large scale vaccinations carried out in human beings have already been referred to and the conclusion is now drawn that—"The mortality from plague has been reduced by two-thirds in the vaccinated as compared with the controls and the general mortality from all causes by 50 per cent. It is to be noted also that, (a) not a case of primary or secondary pneumonia has occurred in the vaccinated as against 17 among the controls, and (b) septicæmia has been much less apparent in the vaccinated than in the controls dead of plague." W. F. E.

Loza (J. D.) *Choice of Rat Poison in Antiplague Work. Rat Poisons used by the National Antiplague Services of Ecuador, Peru, Chile and the Argentine Republic*.—*Public Health Rep.* 1906, May 1, Vol. 51, No. 18, pp. 551-554. Also in *Bol. Oficina Sanitaria Panamericana*, 1938, June, Vol. 15, No. 6, pp. 519-522.

The prime requisite in a rat poison is that it should be slow in action to permit of the rats leaving the spot where it has been eaten, carrying their fleas with them and dying as is their habit, in an inaccessible place as remote as possible from either rat or human habitation. Such a poison is to be found in commercial arsenic. Methods of deratization by poisoning are only temporary but may have to be adopted and frequently repeated by communities too poor to be scattered to employ ratproofing and other antiplague measures of more permanent value." Change of type of poison bait before it becomes used to it its generous use and careful distribution are some of the essentials of a satisfactory poisoning campaign. Formulas of some of the poisons used are—(1) *Poison packets*—coarsely ground corn meal 35, cheap wheat flour 35, grated cheese, ground dried blood, dried blood, finely ground dried meat or finely ground peanuts 15, commercial arsenic 15. Put up in paper packets containing one level spoonful. (2) *Fish poison*—Cheap fresh fish without bones 15, commercial arsenic 15. Spread as paste on bread, banana leaf, paper or shavings and place near rat runs. (3) *Fresh Blood poison*—Fresh blood from the slaughterhouse boiled down to a jelly 60, barley flour or meal, wheat flour, finely ground corn meal or ground salt fish, to give consistency 25, commercial arsenic 15. Spread as in the case of fish poison.

Few accidents have occurred, considering that in Guayaquil, Ecuador, 17,691 pounds of poison packets and over 40,000 pounds of fish poison were used. "The use of the poison packets has caused the death of chickens, some domestic animals, such as cats and dogs, and occasionally a barrow (ass). One child was poisoned." This child ate 10 packets; his brother who ate 6 packets, did not die. "The amount of arsenic in a single packet is just about sufficient to kill an animal the size and weight of a rat." W. F. E.

JACOB (M.) *A Note on the Use of Cyanogen "A" Dust as a Bait and Palleida*.—*Indian Med. Gaz.* 1938, June, Vol. 71, No. 4, pp. 336-338. With 1 fig.

The chief advantage of cyanogen over the "bhooche-batti" commonly used for smacking out rat-holes in the Punjab is that it penetrates much better. It can destroy both rats and fleas at a distance of 15 feet, whereas the bhooche-batti does not reach to more than 10 feet for rats.

and 5 feet for rat fleas. Moreover about one-eighth of all the *blousa bottis* soon become extinguished after the rat holes are closed with mud and therefore fail in their object. Perhaps the chief disadvantage of the cyanogas is the element of danger in its use. This is however small with a competent staff.

W F H

PEIRCE (E. R.) Mesures adoptées contre les rats à Liverpool. [Anti-Rat Measures at Liverpool]—*Bull Office Internat & Hyg Publique* 1936 June Vol. 28 No 6 pp 1119-1128

These measures are given in great detail and will repay direct consultation in the original communication.

W F H

LEESON (H. S.) Further Experiments upon the Longevity of *Xenopsylla cheopis* Roths. (Siphonaptera) — *Parasitology* 1936 July Vol. 28 No 3 pp 403-409 With 3 figs.

Previous experiments were carried out on unfed fleas (this *Bulletin* 1932, Vol. 29 p 839) and contrary to the view of BACOR and MARTIN it was then found that there is no direct proportion between survival of unfed fleas and saturation deficiency of the atmosphere at any temperature. In the present series of experiments the fleas were fed before being starved and the same result emerged that there was no direct proportion between survival times and saturation deficiency. It was found that fleas fed once before starvation lived longer than unfed fleas and fleas kept with the host for 7 days before starvation survived still longer.

W F H

SARUKHAN (D.) IOFF (I.) & TIFLOW (M.) Materials for the Study on the Parasites and Enemies of Fleas—*Rev Microbiol Epidémiol et Parasit* 1936 Vol. 15 No 1 [In Russian pp 27-44 With 15 figs [52 refs] English summary p 44]

REVIEWS AND NOTICES

FEDERATED MALAY STATES. Annual Report of the Institute for Medical Research for the Year 1933 [KINGSTON (A. K. K. Director)—pp vi+126. 1933 Kuala Lumpur Govt. Prints [50 cts or 1s 2d]]

In spite of the absence on long leave during the last three-quarters of the year of the heads of four divisions of the Institute, and the persistence of "depression-level" funds, this report records much valuable research and no diminution of routine work, the demands for vaccine lymph having been exceptionally heavy.

Drs. J. W. FIZZ and J. C. NIVET are making a comparative study of the therapeutic efficiency of Atebrin monosuccinate, Atebrin and Quinine bishydrochloride. Daily parasite counts, the duration of fever and the numbers of re-admissions to hospital are given. The urinary excretion of the drugs has also been followed daily. Atebrin has been detected continuously up to the 41st day after a 7-day course totalling 21 gr. It has been found in the urine within 10 minutes of intramuscular injection of the monosuccinate and within 90 minutes after oral administration. Up to the end of the year 583 cases of acute malaria had been treated. "The findings indicate that atebrin monosuccinate is a valuable drug, particularly perhaps in benign tertian infections, though severe nervous symptoms following treatment, have been noted in two tertian cases."

A year's extensive comparative field trial of atebrin and quinine prophylactic use was commenced in September by the same officers in collaboration with the Malaria Commission of the League of Nations. The figures suggested that "up to the end of 1933 atebrin had been relatively effective," while those obtained with quinine had been better than expected. Interesting findings can also be expected from current anopheline surveys commenced by Mr. G. H. COOMBE.

Continuation of the Selangor Coast Survey resulted in the taking of nearly 6,000 anophelines, of which some 4,500 were dissected. Out of 960 specimens of *A. barbirostris* trapped in one area 11 were found infected. Certain chemical examinations were undertaken of 10 samples of water in which larvae were taken. *A. strobli*, *A. punctans* and *A. negus* were often found associated with salt-water species such as *A. sundanus*.

Notification of an impending change in the diesel oil to be supplied for M.D.B. (Mosquito Destruction Board) mixture, has necessitated further laboratory and field experiments.

A laboratory investigation of spray compared with spray-test methods of anti-larval oiling showed little difference in the efficiency of "disturbed" spray brush and "undisturbed" spray oil.

The blood of each of 16 specimens of the Malayan Flying Fox was found to be infected with a plasmodium infection was attempted without success of over 100 mosquitoes of several different susceptible and culicine species, nor did infection follow injection of the bat's blood into three different species of monkey and a loris.

A decrease has been noted in the incidence of tropical types of certain oil-palm estates after they have been in bearing for some years. The decrease is not easily explained. More infections have occurred at rubber estates.

Further progress is recorded in researches by Drs. R. LEWTHWAITE and S. R. SAVOOR in tropical typhus [See also this *Bulletin* 1936 Vol. 33 pp. 424-433.]

The outstanding finding of the year has been noted to be the experimental carriage of rural "K" virus by *Venopspylia cheopis*. After the original difficulties in maintaining the "K" virus in guineapigs and the strain had become well established passage through fleas seems to have caused a reversion to the type of early passage "K" virus. Bodies morphologically resembling *R. orientalis* have occasionally been seen within the nuclei of endothelial cells of the peritoneum and its exudate (mammalian tissue) recalling such bodies as those described by WOLRICH in epithelial cells of the gut hypoderm and salivary glands of ticks infested with Rocky Mountain Spotted Fever virus.

Peritoneal exudate is a regular feature of "K" virus lesions in the guineapig and has been found to contain 10,000 to 100,000 Minimal Infective Doses per 1 cc while anterior chamber fluid of the eye of injected rabbits may contain 70 to 300 M.I.D. for the guineapig. Numerous attempts have been made to utilize these exudates in the production of a prophylactic vaccine with hopeful results from a few experiments using peritoneal exudate.

Other points in regard to typhus research include —

- (i) Successful storage of "K" virus in peritoneal exudate for 11 days at 0° to -5°C
- (ii) Staining of *R. orientalis*
- (iii) Protective value of human convalescent serum
- (iv) Immunization commenced of a horse against "K" /Japanese River Fever virus.
- (v) Skin reaction following intracutaneous inoculation of "K" virus.

The Vegetable Oil Section of the United Planting Association of Malaya is making a contribution towards the cost of a rat virus enquiry. Poisoning and other methods of rat destruction may also be considered.

An attempt is being made to popularize the local use of palm oil in human dietary. Dr J. A. SIMPSON is therefore undertaking an investigation of its carotene content in connexion with the refining required prior to human consumption. The oil is expected to be a valuable source of energy and by virtue of its carotene content it may be regarded as an indirect source of vitamin A.

Medico-legal requests for the determination of blood groups from blood stains have led Dr J. A. CHELLAH to investigate under local conditions various possible techniques and the effect of age on the stain. Experimentally agglutinins were detected in saline extracts from fairly large stains for a week or two and by a test of absorption of agglutinins from normal Group O serum by scrapings of the stain positive results were obtained even after 9 months.

After prolonged investigation with the Hortvet cryoscope of the freezing point of the milk of local cows and buffaloes Dr J. A. SIMPSON has been able to establish the test as a valuable additional method of detecting added water.

Other general points dealt with include —

- (1) the keeping qualities of a sample of dried insulin no deterioration was found over 6 months at room temperature.
- (2) racial distribution of blood groups

- (3) effect of the Mohammedan fasting month on carbohydrate metabolism on healthy young adults no alteration of the glucose tolerance curve was detected.
- (4) Friedman's modification of the Zondek Aschner Test - 11 successful tests.
- (5) Weekly complement fixation tests by a pooled stock of Wassermann positive serum in dilutions from 1/10-1/160 as an additional check on the standardization of complement.

The visits of Dr V B WIGGLESWORTH towards the end of 1934 and of Dr J J C. BUCKLEY during 1935 both from the London School of Hygiene and Tropical Medicine have been greatly appreciated. Dr Buckley has tentatively identified the cercariae, which appear to cause a special dermatitis "Sarawak itch" among rice-field workers, of *Schistosoma spindalis* a parasite of bovines. P H Metcalf

ROCKEFELLER FOUNDATION Annual Report 1935 [Maximilian [President] — pp. xv + 479 With 20 plates. New York 6 West 49th Street.

That part of the Annual Report for 1935 of the Rockefeller Foundation which refers to Public Health and Medical Science is a record of work of which the Foundation may justifiably be proud. The President, Members and Officers consider that the Rockefeller Foundation has, by now sufficiently demonstrated, in many countries, the feasibility of the control of diseases by local health organizations in future it can render the best service by carrying out research, both in the field and in the laboratory which will lead to the acquisition of new facts, and a more effective and economical method of control.

In the report for 1934 an account was given of several outbreaks of yellow fever in districts in South America, where *Aedes vexans* is not found. In 1935 many cases of this "jungle yellow fever" were discovered in Goyaz and other parts of South Central Brazil, an area of over one hundred thousand square miles, from which the disease had never been reported previously. Jungle yellow fever occurs in open country but not in the towns. Both clinically and pathologically it is identical with urban yellow fever and produces the same lesions in mice and monkeys. The mode of transmission to man is not known. Much work was done in 1935 in the Rockefeller laboratories in New York on possible methods of immunization against yellow fever. In order to attenuate the virulence of the virus, it was grown in tissue cultures, but it was not considered safe to use it alone — it was therefore given with immune serum. As the supply of the latter from human sources is very limited human vaccination was found to be impracticable on a large scale. The serum of immune goats was tried, but gave unpleasant reactions with the immune serum of monkeys much better results were obtained, and this method is being tested in Brazil.

At Fiumicino in Italy anti mosquito work has been very successful. In 1928 when the work was begun, over 5,000 anophelines were caught at certain fixed stations. In each of the three years, 1933, 1934 and 1935 only one specimen was taken at the same places, and the number of dispensary malaria cases fell progressively from about a hundred to only two in 1935. Active malarial measures are also being carried out in Albania, Portugal and elsewhere.

The prevalence of tuberculosis is being investigated at several places in the United States, in Jamaica and Austria and special attention

is directed to the incidence of the disease in the same family and to the relationship between tuberculosis occurring in childhood and subsequently in the adult.

A survey was made of the distribution of yaws in Jamaica where the disease and its treatment were the subjects of intensive study. Flies of the genus *Hippelates* were found to be capable of conveying yaws from man to the rabbit. These small flies often hover about the eyes and have been suspected for a long time of causing severe conjunctivitis in man; in both cases the part that they play is probably a mechanical one.

Substantial grants were made for the furtherance and improvement of public health nursing in several countries and nearly two hundred fellowships in public health were given.

During 1935 a little more than half of the Foundation's expenditure on medical science was devoted to the advancement of psychiatry including clinical neurology, anatomy, physiology and pathology of the nervous system and some aspects of psychology. Contributions were made to certain schools for training and research in these subjects and fellowships were given to well-qualified workers in this field.

The subjects mentioned above are only a few of those dealt with in the Report as usual the whole of it is of much interest and merits careful study.

H. J. Walton

NOCHT (Bernhard) [Dr Ned. Dr Med. H. C. Hamburg] & MAYER (Martin) [Dr Med. Dr Med. Vet. H. C. Hamburg]. *Die Malaria. Eine Einführung in ihre Klinik, Parasitologie und Bekämpfung.* [Malaria. Its Symptomatology, Parasitology and Control.] 2nd Enlarged Edition.—pp. iv + 172. With 24 figs. & 2 coloured plates. 1936. Berlin. Verlag von Julius Springer. [Rm. 15-60]

This is the second edition of a book published originally in 1918. It is based on lectures given to army doctors and medical men proceeding to the tropics. The book contains a good and practical account of malaria on the usual lines as much of it is necessarily rather elementary; there is little scope for originality but it is thoroughly accurate and represents quite adequately the present state of knowledge of most aspects of the subject.

A large proportion of the space is given to treatment and this is particularly well discussed. The pathogenesis and treatment of black water fever are also considered at some length and useful advice is given about the treatment of malaria in patients who have withstood an attack of blackwater fever. The pathology of malaria, antimalarial measures, mosquitoes and their control, are disposed of rather summarily.

The authors state that the book is not intended to be a complete treatise on malaria but a guide to the subject for non-specialist practitioners; there is no doubt that they have attained their object and more.

H. J. Walton

FOSSEN (Arie). *Over maligne halslymphklierzwellen.* [Malignant Tumours of the Cervical Glands.] Thesis for Doctorate of Medicine Medical High School, Batavia.—102 pp. With 7 figs on 3 plates & 1 chart. [58 refs.] 1936. Batavia-C. Kolff & Co

This is a doctorate thesis on a condition which is by no means uncommon in Java and Sumatra. Malignant growth of the glands of the (1884)

neck is seen among Chinese and Malays alike. Some are lympho-sarcomata, some reticuloendotheliomata, others what have been described by ROULET as retothekarsarcomata. The two latter are not the reticulo-endothelial elements of the glands, but by special staining methods reticulin is shown to be present in the latter absent from the former. Whether this is to be ascribed to different grades of anaplasia or explained by the theory that the reticulo-endotheliomata are in the germinal centres of the follicular part of the glands which are practically devoid of reticulin is not yet decided.

Again, these neck tumours may be secondary i.e., metastases from buccal or nasopharyngeal growths occurring early before the primary has been recognized. The author has borne this in mind and in his cases examined these cavities post-mortem when he had opportunity and found that so many patients dying from these tumours of the neck had no signs of any primary growth elsewhere that he believes most of them to be cases of primary gland tumours. A painstaking ^{H.E.S.} ~~pro~~ work.

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PELLAGRA AND PELLAGRA LIKE CONDITIONS IN WARM CLIMATES.

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SECTION III *

Having discussed some of the less commonly recognized features in the symptomatology of pellagra in the last Section, I shall now deal with a number of conditions variously described by authors, which I believe are pellagrous in nature or are closely related to pellagra.

As mentioned above glossitis is a common symptom in pellagra and one which may antedate those upon which a diagnosis is made by months or years. In 1925 and in 1930 I drew attention to the outbreaks of epidemic glossitis among natives, described by observers in Africa and elsewhere and suggested their probable relationship with pellagra. They will be briefly referred to again here.

H. JAMIN (1925) described from Tunis what he called stomatite d'automne an affection coming under observation each autumn in which the patient complains of a sensation of heat and tingling in the buccal mucosa. The chief lesion consists in a desquamatory glossitis with similar changes on the gums lips cheeks and soft palate.

The same year M. NOGUE (1925) published an account of epidemic glossitis in December at Dakar Senegal occurring chiefly among native children. A characteristic denudation of the tongue generally affecting the anterior third was seen often associated with similar lesions on the inner surfaces of the lips and cheeks and excoriations at the angles of the mouth giving rise to a macerated appearance. This condition caused a burning sensation in the mouth on eating. In some outbreaks gastro-intestinal symptoms were also noted and it was observed that both tended to clear up together on improved feeding. It was suggested that the ingestion of peppermint and salt fish played a part, but it is more important to remark the seasonal incidence of the condition.

C. MARCUS & GUILLET (1925) who had the opportunity of seeing the cases described by Nogue add fissuring and hypertrophy of the papillae of the tongue to the picture. They attempted to demonstrate

* Section I appeared in the October issue (pp. 729-741) and Section II in the November issue (pp. 815-825) (1933)

a causative organism but no positive evidence was advanced and the condition remained unexplained.

J. MONTPELLIER, A. CATAXEI & L. COLOVIEU (1927) have published observations on an affection differing little from the above, seen in Algiers but gastro-intestinal symptoms and seasonal variation were not noted.

A rather similar condition was described by J. KAMMERLINGH POEGE (1928) in Palestine as one of the most common and distressing complaints among labourers living on a monotonous diet chiefly of preserved food and legumes. The malady was seen in the months December to February and on grounds which would appear entirely unconvincing was considered as due to the *psammococcus*. The glossitis was accompanied by inflammation of the lips, soreness at the angles of the mouth and in many cases the throat was also involved. After some six to eight weeks the condition improved.

M. G. BLACKLOCK (1925) remarked what would appear to be the same form of glossitis among many of the school children of Sierra Leone which gave rise to local discomfort but no other symptom.

None of these authors has demonstrated any cause for these conditions and at the same time none has suggested the possible link with pellagra.

These outbreaks of epidemic glossitis with a seasonal incidence should be compared with (a) the condition described by J. T. BOUND (1929) among the inhabitants of the outlying islands of Seychelles called *décoquête* in which soreness at the angles of the mouth, soreness and redness of the eyelids, erythematous rash on the genitalia, scrotum or vulva were associated with variable knee-jerk and sometimes affections of vision and hearing. It was noted that suffers improved if they went to the mainland and that those in a position to obtain a better than the average diet did not suffer.

(b) The Outbreak of Exfoliative Glossitis in an Assam Jail published by G. H. FITZGERALD (1932) and (c) the condition denoted as The A and Bavitaminosis disease of Sierra Leone by E. J. WRIGHT (1928) and (1930).

Under the designation Exfoliative Glossitis G. H. Fitzgerald described an outbreak of disease in one-third of the inmates of the Goalghati Jail, Assam consisting of a glossitis in which progressive denudation occurred, with the production of a large, indented, raised red-glazed tongue with enlarged red papillae, associated with a generalized stomatitis, salivation and fissuring at the angles of the mouth and heaped-up white sodden epithelium.

Gastro-intestinal symptoms occurred in 37 per cent. of cases flatulence and eructations, abdominal pain about the umbilicus and oppression after food. Tingling in the hands and feet was noted in 2.75 per cent. a pellagrous-like eruption on the dorsal of the hands and feet occurred in 2 per cent. There was no diarrhoea but a previous history of Flexner infections was obtained in 30 to 40 per cent. of those affected.

The outbreak occurred in the autumn of 1931 and the cases were watched only till April 1932. In March an attempt was made to test the effect of treatment by diet. Improvement took place in 70 per cent. of those from whose diet certain irritative elements were eliminated (chillies) in 70 per cent. of those to whom 2 drachms of cod-liver oil were administered daily while improvement in 82 per cent. was seen

in those to whom cod liver oil and 1 ounce of yeast were given and in 93.75 per cent. of those to whom yeast alone was administered.

After improvement had been thus shown with a few weeks treatment all groups were placed on the standard diet with condiments; active lesions again appeared in 22 per cent.

The jail diet consisted of —Rice 12 chittaks salt 7/16 dal 2½ vegetables 3 mustard oil ½ condiments ½ antiscorbutics ½

The affection described by WRIGHT in Sierra Leone was observed throughout the year but had a marked seasonal predominance towards the end of the rainy season when there is an annual shortage of food. The symptoms in order of appearance had reference to the tongue the angles of the mouth eyes nose anus scrotum and vulva and the nervous system. The first named symptoms are identical with those described in pellagra by STANNUS (1912 and 1913). In addition the texture of the skin of the limbs and trunk in Wright's cases was altered by a keratosis which caused it to be dry and rough. The nervous symptoms included variable knee-jerk tongue tremor sensations of tingling heat cold or numbness impaired vision and hearing later Rombergism inco-ordination ataxia, paresis of limbs.

There is much to suggest that the afflictions described above under the term *Glossitis* are in fact examples of early pellagra or rather what has been termed prepellagra as mentioned in a previous section. Together with *décoquète* they form a series of conditions leading up to that described by FITZGERALD which would be recognized I think by any pellagrologist as pellagra. In commenting upon the affection met with by WRIGHT in Sierra Leone STANNUS (1930) remarked with very little hesitation one may suggest that his cases are cases of pellagra.

In attempting a differential diagnosis from that disease WRIGHT says pellagra with which the disease might be confused is commonly found in the white races —a remark somewhat beside the point. Again he says In pellagra (cf syn. Alpine Scurvy) there is a condition of the gums similar to that produced by a vitamin C deficient diet — showing thereby some misconception upon the point. Further in a table of differential diagnosis Wright states that wasting, effusions and oedema salivation pyrexia painful deglutition irritability and insanity are present in pellagra but absent in the Sierra Leone disease—thus failing to realize I think that pellagra may present a very varying picture and that all or none of these signs may be present in that disease. Further he states that deafness diminished skin sensibility foot and wrist-drop which he finds in Sierra Leone do not occur in pellagra a statement which needs some modification. Lastly in regard to the skin WRIGHT appears to think that in pellagra the lesion is always of the nature of an acute erythema on exposed areas only and that keratosis does not occur thereby exhibiting a disregard for what is known about the skin in pellagra. Enough has been said to suggest that this attempt at differential diagnosis breaks down when subjected to careful scrutiny. The Sierra Leone disease is in my opinion pellagra in all possibility.

FITZGERALD believed that a diagnosis of an early pellagrous condition seemed a probable one in his cases. There can be little doubt he was correct in his surmise in spite of the fact that skin lesions comparable to those of pellagra were only noted in two cases. I would add that probably the irritative elements in the diet served to determine the mouth as the chief site of the pellagrous exanthem.

One of the more recent communications upon these pellagra-like conditions is that by J. V. LAMBOURNE & R. A. PALLISTER (1933) describing an affection characterized by what they call "eczema" of the scrotum, "eczema" of the angles of the mouth and superficial glossitis, followed later by symptoms of combined degeneration of the cord and peripheral vision, occurring among the inmates of the prison at Johore Bahru and due, in their opinion to an avitaminosis B₂.

On 29th August, 1933 among a total of 393 prisoners, 138 had stomatitis and the affection of the scrotum 58 stomatitis only & scrotal affection only. The free margin of the prepuce in some cases and more rarely the anus exhibited changes similar to those at the angles of the mouth. The descriptions and photographs demonstrate clearly that these conditions are the exact counterpart of those described by STAMMUS in African pellagrins though in many of these Johor cases the scrotal condition appears to have been complicated by a toxic infection. About 2 or 3 months after entering the prison nearly 50 per cent. of prisoners developed some or all of these symptoms. The "attack" lasted a few months and was unaffected by an experimental change in diet. In earlier cases if looked for pain, tingling, pins and needles," and numbness in the lower extremities, hæmorrhages of vision and increase of knee-jerk were discovered. Later pain, stiffness and weakness in the legs were complained of. Rombergism and an ataxic gait developed and sensibility to touch pain and deep pressure in the leg, arm and abdomen were affected, even sometimes the face. Vision might be 6/60 but complete blindness was never seen. The pupils reacted but light reaction was sometimes poorly sustained. No case of night-blindness or xeroderma was observed. Mentally some of the patients were dull.

All those showing nervous symptoms had been in the prison over a year. In Johore 9 of 140 prisoners who had been in prison a year, of the total of 393 showed nervous system affection. In Singapore the figures were 34 461 1,210. Those working as cooks appeared to escape the disease. The malady is said to have been noticed in Johor prison for 30 years past. It may also be seen in the poorer members of the outside population. Among prisoners, Chinese, Malays, Indians and one European have all been affected. The affection has also been noted in the Kuala Lumpur Prison, the Mental Hospital at Singapore and among the boys of the Singapore Reformatory.

Investigation showed no more than a mild anaemia in some cases. Four of 17 cases showed achlorhydria.

The results of treatment were interesting. 50 early cases were "cured" after 15 gm. marmite daily for 1 month, 20 relapsed within a month of ceasing to take it! Cod-liver oil and orange juice had a beneficial effect. Four ounces fresh yeast daily cured most cases as did autoclaved yeast, but the best results were obtained by giving half a pound of liver daily. The authors say "The relationship of the disease described and classical pellagra is interesting but a little obscure. Pellagra does not occur in Malayan prisons though sporadic cases do occur in the general population and three such cases are cited—a hawker, a fisherman and a ricksha-puller. All had, besides the classical exanthem, diarrhoea. The hawker had a stricture of the rectum, the fisherman rectal ulceration. The ricksha man had the affection of the lips and scrotum as seen in the prisoner."

Again, the pellagrologist would have no hesitation, I think, in pronouncing this condition described by LAMBOURNE & PALLISTER to be

pellagrous. In this series of cases the high incidence of the pellagrous scrotal skin affection was quite possibly determined by the tinea infection. One wonders if in these cases some other manifestations of pellagra would not have been detected by the trained eye—the hesitation to make the diagnosis of pellagra has been due apparently to the absence of the classical exanthem.

P. MANSON BAHR (1935) in a letter referring to this paper by LANDOR & PALLISTER and their observations upon the lips, tongue and angles of the mouth, states that he noted the same conditions present in 181 of 1461 individuals examined in Ceylon (when studying sprue) among Sinhalese, Tamils, Japanese and Malays alike. The condition was not associated with diarrhoea—at that time he thought it was due to eating dried fish.

D. G. Fitzgerald MOORE (1934) has described a condition of considerable interest among native school children in Nigeria. While 12 per cent. of the boys who were boarders and poorly fed suffered from the affection no cases occurred among those that lived at home and none among the girls who were taught cooking. In all some 300 cases were seen in five years. Some cases were also seen among the poorer ill-fed casual labourers who lived on cassava, dried fish, oil, suet, pepper. At the beginning there was a sore tongue and mouth with aphthous lips—a dry scaly itching condition of the scrotum or vulval irritation supervened followed later by dimness of vision and loss of central acuity but unaffected fields. In these cases a diagnosis of retrobulbar neuritis was made and later pallor of the temporal halves of the discs was seen. Some patients complained of epigastric pain and achlorhydria might be present. The diet of these schoolboys consisted of one cabin biscuit and cassava soup—gari, with only 3 oz. of meat a week practically no protein and much of the cassava was bad.

During the holidays the condition got better or in early cases treatment with marmite oleum morrhuae iron and tombo—a fermented palm sap—yielded good results. The author notes the resemblance of these cases to Wright's cases in Sierra Leone but in one there was retrobulbar neuritis in the other group the cornea was affected.

He believes there is a dietary deficiency involved, but also that gari acts as a toxin.

The interest of this group of cases is obvious linking up as it were some of those considered above. Once more, I should hazard the diagnosis of pellagra in the Nigerian school-children.

The next communication of interest is by L. NICHOLLS (1933 and 1934). He describes a syndrome which he found to be common among the inmates of a gaol in Ceylon consisting of a dry furfuraceous skin and a rash consisting of enlarged sebaceous glands plugged with altered sebum which may become surrounded by a darkly pigmented areola. This rash has a characteristic distribution on the thighs, the external surfaces of the arms near the elbows, the abdomen and across the shoulders and occurs less commonly on the face, neck and chest as is well shown in his photographs. The associated symptoms are dimness of vision a neuritis resembling that of pellagra, burning sensations of the hands and sometimes of the feet, numbness and tingling of the legs, weakness, xerophthalmia, and often death. Diarrhoea was common possibly due to Flexner infections. Most of these prisoners came from an indigent class among whom dry skin and keratomalacia are not uncommon. To the skin condition he gives the name Phrynoderm—a toad-skin.

Later L. NICHOLLS (1933) refers to the bewildering variety of clinical nervous symptoms met with in the cases mentioned above and notes their resemblance to those seen in children and in women towards the end of pregnancy or during lactation well and long recognized in Ceylon. They include burning of the palms and sometimes of the soles, tingling, numbness and weakness, often later mild paresis, ataxia, and rombergism; loss of joint sense, inco-ordination, coarse tremor and at this stage loss of deep reflexes. In children phrynodermia is associated with emaciation and keratomalacia. Examinations of the central nervous system of such children post-mortem showed some degenerate fibres in the posterior nerve roots and posterior columns with scattered degeneration in the lateral and anterior columns, and in the anterior roots.

These cases of NICHOLLS' are examples, one might suggest, of classic pellagra. The condition he calls phrynodermia is no new condition—it has been described by many other writers on pellagra as mentioned in Section 2. His reference to the bewildering variety of clinical nervous symptoms is peculiarly interesting as this is particularly true of pellagra.

Of interest too is a reference by L. NICHOLLS (1933) to a condition he had observed many years before among indentured native African labourers which affected them within a few weeks of their arrival as healthy individuals at the Magadi Soda Factory East Africa. It was characterized by a dry goose-skin-like condition due to an enlargement of the sebaceous glands into papules together with a furfuraceous desquamation. Associated with this condition there was what he called a mild form of neuritis. Later diarrhoea supervened and many deaths ensued. NICHOLLS says that a similar condition occurred in the Native Carrier Corps in East Africa during the War.

These conditions, in my opinion might well be pellagrous, though not recognized as such.

Now NICHOLLS was acquainted with pellagra many years before in the West Indies but I believe at that time no diagnosis of pellagra was ever made in the absence of the text-book trinity of symptoms, and perhaps for this reason he has failed to identify the Ceylon affection with that disease.

We owe another description of this pilo-sebaceous folliculitis to L. J. A. LOEWENTHAL (1933). He described a skin condition among the inmates of the Uganda Central Prison which he considered was due to a vitamin A deficiency. He thought it had not been previously recorded, the only account of any condition resembling it which he knew of being one by PILLAT though in his opinion the two were not identical. One hundred and thirty cases were found in the prison at Mbarara, most of whom also exhibited xerophthalmia and night-blindness. Similar cases were later discovered in the prison at Arusha who sought for

The lesions he describes under several headings—(a) general dryness of the skin of the body (but not of the face) which becomes rough and grey-black in colour the greyness depending on the desquamation. It is most marked on the backs of the hands, the front of the legs, both surfaces of the thighs and across the buttocks, and causes itching. (b) Smooth topped shiny papules, distributed over the exterior surfaces of the arms, the anterior and external surfaces of the thighs and sometimes on the buttocks, loins, chest and back. (c) A folliculitis in which the mouths of the pilo-sebaceous follicles are sealed

with a mass of horny tissue accompanied by hyperkeratosis in the immediate neighbourhood and deep black pigmentation (d) Acne. As the cases clear up the contents of the follicle are extruded leaving a black macule. The diet consisted of maize 20 oz beans 5 dry meat 2, nnt 3 suet ½ sweet potato 10 oz. The cases quickly improved with the exhibition of vitamin A-containing substances *vix* one ounce of cod-liver oil.

LOREWENTHAL has given a perfect account of the pilo-sebaceous lesions as they occur in pellagra—the association with the dry rough skin condition as described further links these cases up with that disease. The resemblance of this condition to that recounted by NICHOLLS is obvious further made good by xerophthalmia in both sets of cases. In the Ceylon cases however there were added nervous manifestations.

I must here digress for the moment to discuss what for short I will call the folliculitis as above described.

G P GOODWIN (1934) has described the same condition in a child aged 10 in a London hospital as a cutaneous manifestation of vitamin A deficiency. Associated with the folliculitis (I was very kindly given the opportunity of seeing the boy) there was dryness of the skin particularly noticeable over the legs and feet the nails of the fingers and toes looked drier than normal a small area of moist eczema was present at the left angle of the mouth injection of the cornea was noted the tongue was red and smooth being denuded of its superficial papillae the gums were swollen no xerosis no gastro-intestinal symptoms. Dr Helen MACKAY (1934) in reviewing the subject of vitamin A deficiency in childhood suggests that in more advanced cases to the above-mentioned symptoms might be added periods of diarrhoea emaciation scaly pigmentation followed by a shrivelled condition of the skin with powdery or flaky desquamation xerosis and mental apathy—a condition which, leaving out the question of causation I suggest might well be included under the designation of pellagra.

A. PILLAT (1929) writing from Peking in an article on keratomalacia among the Chinese includes under this heading xerosis conjunctivae and xerosis cornea as well as keratomalacia proper. He finds that night-blindness may be found in these patients and that besides these are many other associated signs including a pale grey colouring of the skin of the face neck and forearms which later becomes yellowish. The skin may be puffy and the face look bloated. The skin becomes covered with a remarkable quantity of scurf like powdered flour and there is an affection of the sebaceous glands causing large numbers of comedones on the face the secretion remains in the ducts and the skin about them becomes black. The skin is dry and rough due to hyperkeratosis in some cases ulceration occurs referred to by PILLAT as Dermomalacia. The hair is dry and falls the nails become dry furrowed and white. There is decrease in hydrochloric acid secretion diarrhoea hoarse voice, bronchitis and a genito-urinary affection all of similar nature *i.e.* a disturbance in the nutrition of epithelial cells due he thinks to a vitamin A deficiency.

The resemblance of LOREWENTHAL's cases to the condition described by PILLAT and of both to pellagra is obvious.

Another recent paper is one by J. HARKNESS (1935). He has described what he considered to be a deficiency disease among natives of the Bukoba district of Tanganyika Territory whose diet consisted chiefly of cooked bananas small quantities of ground nnts and beans and but very rarely fish meat or milk.

The chief symptoms were night-blindness, with ulceration of the cornea in some cases, and chronic enlargement of the parotid glands. The tongue was sore, glazed, and tremulous or coated in the middle and red at the margins with denudation—the gums were also sore.

Dermatitis is seen and in the early case the skin is slightly scaly and the seat of burning and itching. A butterfly patch over the molar and molar regions is present. Casal's necklace is more rarely to be observed. The hair of the outer side of the eyebrow is lost and the nails are brittle and cracked. "In later stages the skin is thick and rough, especially on the elbows and backs of the hands. The patient becomes dull, stupid, and subject to dementia. Intestinal diarrhoea, emaciation and death in advanced cases occur." Profound atrophy of the intestinal mucosa was found post-mortem. The author believes the condition to be pellagra, and there can be little hesitation in agreeing with him.

In a *Contribution à l'étude des syndromes d'avitaminose A* Déserti (1934) cites cases met with among native labourers in the Bas-Congo. He appears to believe that in beriberi there are two syndromes, the one comprising the cardiac condition and oedema due to shortage of vitamin B, the other including the neurological manifestations due to toxic-infections by various organisms which come into play as a result of gastro-intestinal disturbance. Among his cases, however, are a number exhibiting symptoms very reminiscent of pellagra rather than beriberi: conjunctivitis, blepharitis, a plaque of hyperkeratosis under each eye, a rhagades-like condition at the palpebral and buccal commissures, infiltrated tongue, gingivitis, the mucous membrane being depolished and covered with a grey adherent pellicle. There was no affection of the cornea. He speaks of the "syndrome osso-boudou" and thinks it has affinities with scurvy. It clears up upon an hypovitaminic diet.

The last of these recent papers which I shall include here is that by N. L. Corkill (1934) concerning pellagra among a small group of millet-eating people living to the N.E. of Khartoum, Sudan. Pellagra among millet-eaters in Egypt has been recorded by W. H. Wilson (1921); but only two cases of the disease had been previously noted in the annual Reports of the Sudan Medical Service. Although the diagnosis of pellagra was made by Corkill his cases are included here as the discussions rested upon all the less common manifestations of the disease in which I have drawn attention and no case of frank "text-book" pellagra was seen. The history of the discovery of the malady in the Butana country by Corkill is well worth being read as an example of how illusive pellagra may be. The data were collected during two visits to the district of only a few days and many of the facts gradually emerged in conversation with the people.

Putting two and two together he found a group of symptoms which included weakness, wasting, flatulent dyspepsia, a history of diarrhea, "burning pains" in the extremities (almost diagnostic—it occurred in nearly 90 per cent. female and 80 per cent. male cases), pains in the body, head and limbs, vertigo, abnormal knee-jerks, mental symptoms, etc. There was a history that night-blindness was common among these cases. There was also a history of burning pain in the skin followed by swelling, dermatitis, desquamation, and pigmentation. Pilo-sebaceous gland dysfunction, powdery desquamation and "sulphur flake" were noted. Typical glossitis, stomatitis, pigmentation of the gums and angular stomatitis were found to be present, but

there is no mention of the similar conditions of the prepuce anus and vulva, nor of any affection of the scrotum probably because the necessary examination was not carried out. Finally there was a seasonal incidence associated with the symptoms.

Lastly reference must be made to H. STRACHAN's observations in Jamaica upon a series of cases among which there were undoubtedly some of pellagra, as I have previously pointed out. At the time he ascribed the malady which he recorded as due to malaria though he remarked that there were many features suggestive of beriberi. His observations were first noted in *Sajous's Annual* (1888) his paper later appearing in the *Practitioner* (1897). Among the symptoms were burning pains in the palms and soles numbness and cramps in the hands and feet the palms and soles showed hyperaemia and fine desquamation and became more and more deeply pigmented as might the whole body there was branny desquamation at the margins of the eyelids lips and nostrils the corners of the mouth the prepuce anus and vulva were the seats of excoriation hyperaemia of the conjunctiva and of the mucous membrane of the mouth with loss of surface epithelium of the tongue were noted emaciation was marked and a number of deaths occurred.

There were besides references to an odd medley of nervous symptoms some of these suggest pellagra but H. H. SCOTT criticizing Strachan's reports thinks that he without doubt included under the one heading of Peripheral Neuritis a variety of cases of all kinds.

In 1930 I referred to SCOTT's interesting description of an acute outbreak of central neuritis in Jamaica and to his observations upon the resemblance of the nervous lesions found to those in pellagra though he thought the evidence was against the condition being acute pellagra or any other deficiency disease. He rather believed this Jamaican outbreak was due to an intoxication the toxin entering by the mouth. It is just worthy of note however that the epidemic occurred among adult native labourers male and female on sugar estates during the cutting of the cane crop and ceased when this operation was over. The onset was very acute 50 to 100 new cases occurring per day.

The first symptom was always a conjunctivitis with swelling and redness photophobia ulcers and abrasions of the lids. The second symptom was burning of the mouth which was red inflamed, and the site of aphthous ulceration with fissuring at the angles of the lips. The tongue was not sore as a rule and salivation not common. Some two weeks later either (1) diarrhoea set in from which recovery might take place spontaneously without further symptoms or from which the patient died or (2) constipation with nervous symptoms developed, consisting of burning in the toes and soles of the feet a feeling of numbness and tingling spreading up the leg causing inco-ordination and difficulty in walking but no loss of power or sensation, absent knee-jerk but no wasting. The upper limbs might be similarly affected and later there might be diminution of visual and auditory acuity and a peculiar steppage gait which remained permanently. The ordinary diet of these people was deficient in protein but contained an excess of carbohydrate and consisted of yam bread fruit cocoa peas beans corn meal salt fish, etc. but during the harvesting the workers lived almost entirely on sugar cane.

Burning pains in the soles of the feet and in the palms of the hands is a symptom so constantly recurring in the descriptions of the

symptomatology of pellagra that I have come to consider it as one of considerable importance and great diagnostic value. The non-mention of this symptom in some accounts I believe does not necessarily mean that it was not present as in many cases only such signs are given as to warrant a diagnosis of pellagra. It will have been noticed in discussing the pellagra-like conditions above how often this symptom has been noted.

In the pages which follow I have tried to give the history of the recognition of this manifestation as it has been described as a separate symptom.

On November 5th, 1825 J. GRIERSON Esq. (1826) attached to the Arakan division of the army presented a paper before the Medical and Physical Society of Calcutta entitled "On the Burning Feet of Native."

It exists, he says, "in various degrees of severity from an uneasy harassing sensation of heat and tingling to the painful extreme of burning destructive of sleep and appetite in the first instance and latterly of serious injury to the general health." The affection may also include the palms of the hands, aching along the tibiae is a common accompaniment, and giddiness may supervene. The condition may be unconnected with other troubles or may be associated with "febrile and bowel complaints."

Grierson did not know of any previous observations on the subject but refers to an affection of the soles of the feet among Lepidlanders, for which the bark of the beech is used "as a remedy for unpleasant symptoms resulting from checked perspiration."

In a footnote to this paper there are some remarks concerning treatment of the condition by Mr. PLATTAIR (1836).

"Burning of the feet" was described by Assistant Surgeon MALCOLMSON of the Madras Medical Establishment (1835) as occurring in Madras sepoys at Ava during the Burmese War when subjected to fatigue and exposure on a diet consisting of rice, 2 oz. ghee, a little salt, fish and spices, and was differentiated from beriberi.

WARING (1880) in an article under this same heading states, almost unknown before the first Burmese War in 1825 it is an affection much more commonly seen in Arakan, Burmah, the Tenasserine Province, Penang, Singapore and other eastern settlements and less common in India. The symptom of burning feet may be the only one present but

most generally appears as a sequel of fever, bowel complaints, rheumatism and beriberi and is not infrequently concomitant with some form of leprosy. The mention of leprosy is interesting as it seems possible that a pellagrous eruption was here mistaken for leprosy. This author quotes Malcolmson as considering the affection to be

connected with scorbutic disease," he also points out that the palms of the hands may be similarly affected. The anterior part of the foot, chiefly the seat of the pain, the instep and heel less, according to GRIERSON.

WARING also quotes MCKENZIE "The precursory symptoms languor, loss of appetite, pain in extremities, shooting over body, more acute in larger joints, countenance anxious and cachectic, bowels usually regular sometimes seized with looseness, debility, irritability, sleepless nights, emaciation, burning and pricking at the soles of the feet and palms of the hands, in due course diffused over the whole body with exacerbations by day and remissions in evening with sundown exhaustion and sometimes death."

PLAYFAIR is also quoted as pointing out that there are two types of the malady—in the one sweats occur in the other the skin is dry and scaly again a significant observation.

BILLOD cites HURST as saying that Burning Feet among Cipayes (Sepoys?) was attributable to the use of damaged rice.

J N DUGDALE (1928) writing upon Burning Feet in Estate Medical Practice in Malay found the condition most commonly in middle-aged, ill nourished coolies who had been in the country months rather than years. There was no redness and rarely swelling but sometimes engorgement of blood vessels. There was an associated peripheral neuritis (sic) with wasting and rombergism. Sir David GALLOWAY is quoted as having been familiar with the condition for 40 years and Dr WILSON knew of it in Johore. In correspondence A B J COOPE (1928) stated that in Johore the condition was confined to Tamil coolies and associated with night blindness and evidence of scurvy—swollen gums emaciation harsh dry scaly skin variation in pigmentation and cracks in the lips. The affection occurred in periodic waves at times of economic stress it responded to antiscorbutic treatment. Assistant Surgeon W RAY (1902) alludes to a few cases of pellagra in N Behar in which burning of the skin of the feet and hands was a prominent symptom associated with reddish areas of skin roughness and dryness the tongue was red and dry and diarrhoea was present but no nervous symptoms were noted. W B MORGAN (1929) refers to the condition—a deep seated burning sensation in the soles of the feet—as common among Tamil emigrants to Malay recruited from S W Madras but not among Telugus who take a better diet. The symptom appears after twelve months residence in Malay and is associated with insomnia mental depression and nostalgia. More than half of these patients showed small black cutaneous nodules over the external surface of the legs and forearms. Nitroglycerine was given on the supposition that there was over-stimulation of the sympathetic nerves due to a deficiency of vitamin B group and a diet of maize-ragi eggs and mutton. Cure is said to have been thus effected in two weeks. This affection is seen in Singapore Deccan and in Ceylon but not in Java and Sumatra it is stated.

BRAHMACHARI (1923) referring to an outbreak of epidemic dropsy in 1919-1920 at Krishnagar when 127 out of a total of 171 cases came under observation places burning pain in the soles and palms as among the most common symptoms. It was associated with pains in the calves of the legs anorexia, diarrhoea, weakness anaemia, and oedema. The knee-jerks were normal in 90 per cent. of cases. No mention was made of skin lesions.

J C R BUCHANAN (1932) has recorded interesting observations upon a condition which attracted his attention by the universality of its occurrence in Somaliland among the natives one of the chief symptoms being burning feet. One hundred cases were analysed. Pain of rheumatic type was almost universal—general aches pain in joints bones and muscles headache and backache tender shins. Burning feet and itching or tingling of the skin also constituted a characteristic symptom in 39 per cent. Burning palms was noted in 3 only of the 100 cases. Oedema in the vast majority of cases confined to the legs, occurred in a large proportion. Severe pyorrhoea was very general among them and epigastric pain occurred in 45 per cent.—a dull heavy pain worse after food, but the appetite was not affected constipation was the rule the urine showed no albumin. In 15 cases

there was some myocardial involvement. Some of the ordinary signs of pellagra such as skin changes, soreness of the tongue and lips, diarrhoea and psychosis were noted among these people.

This disease if it can be so called, is a very chronic one "it may go on for ten years without producing much more than slight disability and would appear to be seldom if ever fatal." The condition seems among various groups, jungle native and townman, on rather different diets, but the author remarks "It can be said that these diets contain most of the essential elements but that they lack variety and balance it is doubtful if the vitamin content is always adequate." The margin of safety is small, it is said, but it is noteworthy that in the several group-diets meat and milk appear though fresh vegetables are completely absent. The results of treatment were interesting. Of 22 cases treated by intravenous injections of 10-25 minims of thiamine hydrochloride 4 to 8 cc. distilled water twice weekly 19 improved. Of 17 given in addition of yeast and onion to their diet 14 improved. On continued treatment 10 out of 11 improved. The author thinks that the condition resembles the "pre-beriberi" of V. MARADEVAK & L. K. RAXAV (1930). This seems rather doubtful as in these authors case the prominent symptoms described as those of larval beriberi consisted of numbness and tingling with areas of anaesthesia of the skin of the lower extremities, diminished or absent knee-jerk and tenderness of the calf muscles. BUCHARAN's cases would appear to have closer affinities with pellagra.

L. R. SHARPLES (1929) has described "Burning Feet" among Hindu Bengalis born in British Guiana and notes that it is not seen in the rest of the population. It is much commoner among the women, and between the ages of 17 and 40. The hands may also be affected, the pain is worst in the tips of the fingers. Patients also complain of darkness of the eyes so that their vision is impaired (night blindness). There may be rombergism and in severer cases some anaesthesia on the dorsa of the feet but no paresis or wasting. No anaemia is found though ankylostome infections are universal. The diet consists of milled polished rice and flesh is eaten. Symptoms subside on a good mixed diet being given.

These various groups of cases of "Burning pain" in the soles of the feet and palms of the hands, it will be noted, have been described as having other associated symptoms in most cases. Considered together they would appear to have a close similarity to other groups of cases before mentioned, allied to pellagra.

Reviewing all the conditions which I have suggested are pellagra-like we see a number of afflictions in which some one or more symptoms are associated to form a series of syndromes but all the various symptoms in the several syndromes are symptoms met with in pellagra. Some of these afflictions are obviously frank pellagra some might be called pre-pellagrous states or larval pellagra.

In some of the syndromes one or two symptoms appear to dominate the picture rather to the exclusion of others, with considerable variation in the several groups, but the linking and overlapping is very remarkable when all are considered in series.

In collecting together in the form of a summary the various conditions which form the subject of this article it has been my purpose in the first place to help towards the better understanding of the symptomatology of pellagra and secondly to stimulate further interest in that disease and pellagra-like afflictions.

Shortly I hope to publish a reasoned discussion upon the aetiology of the disease and some points in its pathogeny

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TROPICAL OPHTHALMOLOGY

A REVIEW OF RECENT ARTICLES. XXVI.*

Trachoma.—MACCALLAN¹ defines trachoma as "a specific contagious disease of the conjunctiva in man. It is chronic in nature. It is characterized by a sub-epithelial infiltration of the conjunctiva by cellular exudate which spreads to the cornea and to the tarsus. It is followed by cicatrical changes in the affected tissues. The inflammatory cells may cause no obvious follicle formation but merely add a widespread subepithelial infiltration which makes the conjunctiva red and velvety. Bleb-like excrescences which emit a gelatinous material, form in the tarsus during the second stage of the disease owing to a blocking of the ducts of the meibomian glands. The conjunctival secretion in the first stage shows no pathognomonic change or microscopical changes and reliance must be placed on the characteristic vascularization of the upper fifth of the cornea, which is detected by the slit-lamp."

Research by PULVERTAFT² into the nature of the follicles found in the second stage of trachoma has led him to suppose that there are not true follicles, but excrescences due to blockage of the meibomian ducts owing to cicatrical contraction of the tissues. True follicles do not undergo degenerative changes, and their contents cannot be expressed. He found that the histological changes in the disease are comparable with those occurring in many sub-epithelial inflammations—such as chronic superficial glossitis. The sub-epithelial tissues are densely infiltrated with small round cells—mainly lymphocytes, with some plasma cells—the pathological lesions are in no way distinctive, being merely the familiar ones of inflammation and incomplete repair.

MARCUS & WADNER³ have studied the varieties of cells found in trachomatous material. After reviewing the observations of other pathologists they describe their own technique. The smears are made from the retro-tarsal fold without using much pressure and after drying are fixed in ethyl alcohol. Giemsa's stain (1-2 drops per cc. of distilled water) is used to stain this preparation from 45 to 60 minutes. Eosin azur II is also strongly recommended. 1 per cent. aqueous solution of eosin with azur II 8-9 drops of the solution is added to 50 cc. of distilled water and the slide is stained for from 30 to 45 minutes. They are unable to confirm the findings of some writers that the predilection of certain cells is characteristic of the different stages of trachoma. Polychrome erythrocytes and normoblasts were found in all stages. Lymphoblasts, some undergoing mitosis, varied in numbers from 1 to 11 per field. Lymphocytes are very plentiful in the early stage of the disease but become more scanty with its progress and very few are found in the third stage. Eosinophiles were very rare and this poorly

For the twenty-fifth of this series see Vol. 33, pp. 448-453.

¹ MACCALLAN (A. F.). The Relationship between Conjunctivitis and Trachoma.—*Brit. Jl. Ophthalm.* 1936, June, Vol. 20 No. 6, pp. 346-350.

² PULVERTAFT. The Nature of the So-called Follicles in the Second Stage of Trachoma (Tr. IIa).—*Rev. Internat. de Trachome.* 1934, Jan. Vol. 11 No. 1, pp. 19-33 [10 refs.]

³ MARCUS (J. M.) & WADNER (K. G.). La cytologie de la conjonctive dans le trachome et les conjonctivites folliculaires.—*Rev. Internat. de Trachome.* 1936, Apr. Vol. 13 No. 2, pp. 69-82.

constitutes a valuable diagnostic feature. The epithelial cells show more marked degenerative changes than in other forms of conjunctivitis.

BRUCK⁴ has noted the peculiar rarity in Palestine of pannus in trachomatous patients though entropion and trichiasis are common. He attributes the blindness which is rife to secondary infections by Koch-Weeks and the gonococcus. He was impressed by the early age at which trachoma develops.

Faïd MASSOUD⁵ after a study of 4,000 trachomatous patients concluded that the disease was mainly acquired in infancy and that faulty diet and bad personal hygiene added to local irritation played an important part in its causation. Over feeding and improper diet appeared to be more deleterious than actual under feeding. Over feeding is common among the babies of the poorer classes in Egypt.

SÉDAX⁶ has recorded the history of an Armenian family in Marseilles which consisted of a trachomatous grandmother father mother and two elder children with three non trachomatous younger children. Two of the latter contracted measles and shortly afterwards developed trachoma whilst the third remained free from both diseases. He attributes this infection to the fact that the children were looked after by their trachomatous brothers during the measles at a time when their conjunctival resistance was lowered by the disease. Their trachoma proved to be of an obstinate nature despite drastic treatment.

CHARAMIS⁷ has reported favourably upon Brecker's treatment of the disease by the injection of detoxicated bee venom beneath the conjunctiva of the lids.

Cornea—DUGGAN & NANAVATI⁸ have reported their experience of tattooing corneal leucomata with gold and platinum chloride. Twenty nine opacities were tattooed with gold chloride and fourteen with platinum chloride. Tannin in 1 per cent. solution used as a reducing agent was found to be more painful than hydrazin hydrate and produced a lighter tint. After an interval the stained area tends to become smaller and somewhat mottled but the final result is satisfactory.

Cataract—WRIGHT⁹ expresses the opinion that though the question may be doubtful cataract really is exceptionally common in India. Of 2,000 outdoor workers between the ages of 40 and 60 resident in a dry and arid district the cataract incidence was one person in 5. Of 2,000 working in a humid and fertile area (West Coast) the incidence was one person in 34.

⁴ BRUCK (A. J.) Sur le trachome en Palestine.—*Rev Internat du Trachome* 1936 Apr Vol 13 No 2 pp 98-104

⁵ MASSOUD (Faïd) Trachoma as an Endemic Disease in Egypt.—*Rev Internat du Trachome* 1936 Apr Vol 13 No 2 pp 111-118 [21 refs.]

⁶ SÉDAX (Jean) Deux cas de contamination trachomateuse familiale après conjonctivites morbillieuses pétalables.—*Rev Internat du Trachome* 1936 Jan Vol 13 No 1 pp 43-50

⁷ CHARAMIS (J.) Le traitement du trachome par le virus d'abeille.—*Rev Internat du Trachome* 1936 Jan Vol 13 No 1 pp 27-34

⁸ DUGGAN (J. N.) & NANAVATI (B. P.) Tattooing of Corneal Opacity with Gold and Platinum Chloride.—*Brit Jl Ophthalm* 1936 July Vol. 20 No. 7 pp. 419-425

⁹ WRIGHT (R. E.) Incidence of Cataract at Certain Age Periods in South Indian Districts.—*Brit Jl Ophthalm* 1936 Sept. Vol. 20 No 9 p 545 (1937)

Glaucoma — KIRKMAN¹² has investigated the occurrence of primary glaucoma in patients suffering from epidemic dropsey. He remarks that this is the only general disease at present known in which glaucoma forms an integral part and is consequently of vast importance as it provides such a field for research. Epidemic dropsey is an entirely different disease from beriberi. Its two outstanding manifestations are the vaso-dilatation of the whole capillary system and an increased permeability of the capillary endothelium. It appears to be associated with the ingestion of diseased, stored, parboiled rice. Gram-positive organisms with certain special characteristics are frequently found in the stools, and similar organisms have been recovered from diseased rice. The canal of Schlemm and the neighbouring tissues appear normal also the epithelium of the ciliary processes, but the latter are extremely hypervascular and there is great dilatation of the choroidal capillaries. Inflammatory changes are however absent. In the aqueous humour of patients suffering from epidemic dropsey glaucoma there is a marked increase of the albumens while the globulins remain the same. In a certain number of patients suffering from the disease a histamine-like body has been proved to be present in the aqueous humour. The enormous number of 1,005 cases was seen during 1931 and 1935.

Miscellaneous — In an article on myopia in China RASDRAK¹³ remarks how very common the condition is in the country. He attributes this to gross over-strain of accommodation and convergence owing to the bad conditions in which work of various kinds is carried on. Progressive myopia is however extremely rare. Trachoma and corneal ulcers account for most of the blindness in China.

CHAKRABORTI¹⁴ has furnished some excellent hints to the general practitioner on the subject of difficulties likely to be encountered in ophthalmic practice. He states "the eye is a delicate organ and as such it should be handled with extreme gentleness and care. The mildest medicines, namely normal saline lotion and boric lotion, liquid paraffin drops and boro-vaseline should as far as possible only be prescribed. He lays proper emphasis on the connexion between inflammations of the skin and conjunctivitis, and also advocates cold applications in cases of trachoma.

BUSCHKE¹⁵ has reviewed the rôle played by the vitamins in ocular nutrition especially lens nutrition. He quotes the observations made by various authorities and stresses the importance of considering the mutual interaction of the different essential food factors.

¹² KIRKMAN (E. O.G.) The Aetiology of Chronic Primary Glaucoma.—*Brit. J. Ophthalm.* 1936 June Vol. 20 No. 6 pp. 321-331 With 3 figs & 1 coloured plate

¹³ RASDRAK (O. D.) The Incidence of Myopia in China. Data and Theory from Periodical Investigations covering Thirty Years. Results and Association with Refracting and Hospital Centres in a Score of the Largest Cities.—*Brit. J. Ophthalm.* 1936 June Vol. 20 No. 6 pp. 347-360 With 1 fig

¹⁴ CHAKRABORTI (C. R.) Pitfalls in Ophthalmic Practice.—*Indian Med. Gaz.* 1936 Apr Vol. 71 No. 4 pp. 399-403

¹⁵ BUSCHKE (Wilhelm) Die Vitamine in der Ophthalmologie.—*Ztschr. f. Ernährungswiss.* Berne 1936 Jan. Vol. 3 No. 1 pp. 37-43 (17 figs of refs.)

Toxic amblyopia is not very common in the tropics. OAR¹⁴'s observation on its treatment with acetylcholine is nevertheless interesting. He assumes that arteriole constriction is chiefly responsible for the symptoms and in support of his hypothesis quotes DUGGAN's successful use of sodium nitrite intravenously. He injects intra muscularly 0.1 gram of acetylcholine (B.D.H.) or 1 cc. of acecholin (Anglo-French Drug Co.) daily for a week and claims very marked success in three chronic cases. He suggests that the treatment may be of use in retinitis pigmentosa.

¹⁴The *Bulletin of the Ophthalmological Society of Egypt* (Vol. 28 1935) contains many interesting papers by members of the Society. Contributions to the study of conjunctival disease are perhaps the most important. Faud MASSOUD directs attention to the necessity for care as regards personal hygiene and diet of the trachomatous patient in addition to ordering local treatment. Rapid improvement in the conjunctival condition is noticed when a bath is taken daily. Most of the members agreed that infection due to prevalent ophthalmias played an important part in the incidence of trachoma. R. P. WILSON remarks that very mild cases of trachoma may be met with; these may undergo a spontaneous cure but evidence of vascular invasion of the cornea can always be found in them. Some of the conjunctival conditions in school children diagnosed as trachoma are not trachoma at all. IBRAHIM AHMED MAHOMED has found conjunctival eosinophilia to be much more common in Egyptians than he expected. Eosinophilia occurs quite often in trachomatous patients and is unconnected with spring catarrh. Wilson in a study of the seasonal incidence of acute ophthalmias was struck by the suggestive fact that the minimum summer incidence coincides with the fall in the number of flies. M A H ATTIAH discusses the clinical aspects of phlyctenular disease in Egypt. M KHALIL describes fully Lacarrère's method of cataract extraction by diathermic coagulation. An unusual type of lipid infiltration of the cornea is described by A. M. SOLIMAN. M. A. ATTIAH and M. SOROUR record their experiences of treatment of corneal ulceration by the injection of an extract of placental tissue and umbilical cord.

H Kirkpatrick

¹⁴Oar (H. Campbell) Acetylcholine in Tobacco Amblyopia.—*Brit Med J* 1938 July 11 pp 69-70

¹⁴BULLETIN OF THE OPHTHALMOLOGICAL SOCIETY OF EGYPT 1935 Vol. 28 Session 32 pp xxx+271 With numerous illustrations.

THE TYPHUS GROUP OF FEVERS.

QUARTERLY BULLETIN OF THE HEALTH ORGANISATION League of NATIONS. Geneva. 1936. Mar Vol. 5. No. 1 pp. 140-151 — Typhus (Rickettsiosis). (Report of Committee on Typhus Fever and Resolutions of Pan-African Health Conference, Johannesburg Nov 20-30 1935 pp. 140-141) Clutter (E. H.) Typhus and Typhus-like Diseases in South Africa (Annex I pp. 142-149) [20 refs.] de Boer (H. S.) Typhus Fever in Uganda and its Control [Annex II pp. 149-151]

i. In the opinion of the Committee tick typhus (tick bite fever) and flea-borne typhus do not constitute serious public health problems in S Africa, they are as a rule mild diseases and are non-epidemic.

Louse typhus is however a very serious problem in many African States. There were approximately 1 000 deaths in the Union of South Africa during the year ending June 1935. Preventive measures being adopted consist of various methods of detoxinating blankets, clothes and the people themselves. It was agreed that no real progress against the spread of typhus can be made without greatly improving the economic status of the native in the States affected.

ii. The three types of typhus fever met with in South Africa, tick-bite fever, rat flea typhus and louse typhus, are fully described on the basis of the work of Pijper and Dau already summarised in this Bulletin [1935 Vol. 32, pp. 154-561]. Tables are given showing the incidence of louse-borne typhus in the Union of South Africa from 1921 to 1933. 34 968 cases were reported in this period and as is pointed out probably a large number of the milder cases were never reported at all.

iii. An account of an outbreak of louse-borne typhus in the Kigezi district of Uganda.

In 1933 there were 150 cases with 10 deaths		
1933	123	20
1934	103	6

These natives are clothed in goat skins with the hair left on, the skins could not be disinfected by steam as this method destroyed the skins but a method of disinfection by means of dry heat was devised and has proved a great success.

The skins are spread over a wicker basket and dried cow dung is burned underneath, the skins could be left on the frame for many hours without damage and lice and eggs were killed in less than half an hour [See Bull of Hyg 1935 Vol. 10 p. 629 where an illustration of the apparatus is given.]

D. Harry.

BULLETIN DE L'ACADEMIE DE MEDECINE DE ROUMANIA. Paris
1936. Vol. 1 No. 3 pp. 569-575 With 1 graph—Rapport
de la commission nommée par l'Académie de Médecine, sur le
plan de lutte contre le typhus exanthématique. [Progress of
Exanthematic Typhus. Report of the Romanian Academy of
Medicine.]

The first part of this report is historical and deals with the large epidemics of typhus which devastated Serbia, Gibral and Russia during the European War 1914-18.

Although typhus has now disappeared from Western Europe it still abounds in Rumania Russia and Bessarabia and from these endemic centres epidemics break out every year in the winter time. The methods recommended by the Commission for combating these epidemics are similar to those evolved during the war. Diagnosis notification isolation and disinfection of cases. Establishment of disinfection stations in towns and villages and also scientific laboratories for the study of the disease.

D H

PINKERTON (Henry) *Criteria for the Accurate Classification of the Rickettsial Diseases (Rickettsioses) and of their Etiological Agents.*—
Parasitology 1936 Mar Vol. 28 No 2. pp 172-189 With
10 figs. on 2 plates. [27 refs.]

In recent years acute febrile diseases of man in nearly all parts of the world have been recognized as belonging to the rickettsia group. The occurrence of mild and atypical forms appears to be an outstanding characteristic of this group of diseases and this makes their differential diagnosis a difficult matter. The author deprecates the tendency to assign a local or personal name to organisms seen in incompletely studied strains since this has often led to distinction without differences and to the accumulation of invalid terms in the literature. He considers that it is possible to classify accurately these diseases if complete morphological, histopathological and immunological studies are made and the object of the paper under review is to define and tabulate the criteria on which such an accurate classification may be based.

Criteria for Classification

1 *Cross immunity tests*—For practical purposes this is perhaps the most important single criterion if correctly carried out and interpreted.

2 *Study of smear preparations from the scrotal sac exudate of guinea-pigs and rats.* Points to be observed are (a) pattern of cell infection (b) type of cell invaded (c) morphology of organism.

In typhus for example the cells are packed with organisms and the serosal cells only are invaded.

In spotted fever the organisms are scanty and both serosal cells and macrophages are invaded the organism in spotted fever is larger than that in typhus and is more lanceolate and diplococcioid in shape and form a halo may also be observed.

3 *Histopathology*—For these examinations the most suitable material for examination from the guinea-pig is obtained from the scrotum scrotal sac epididymis and testis.

Typhus nodes may be found in material obtained from guinea-pigs infected with typhus and also in those infected with mild spotted fever but the characteristic lesion in spotted fever is the formation of acute fibrin thrombi in arterioles and venules. These thrombi contain polymorphs and may occlude the lumen of the vessel the term thrombocytosis is applied to this condition which has never been observed in animals or man infected with typhus.

4 *Location and morphology of organisms in sections*—In typhus the mesothelial cells lining the tunica are packed with organisms but none are seen in macrophage cells nor are the smooth muscle cells invaded. In spotted fever mesothelial cells and also macrophages contain organisms but only scanty in number and the organisms are also present in the smooth muscle cells a diagnostic point already described in 1919 by WOLBACH.

THE TYPHUS GROUP OF FEVERS.

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D. Harry

BULLETIN DE L'ACADEMIE DE MEDICINE DE ROUMANIA. Paris 1938. Vol. 1 No. 3 pp. 569-575 With 1 graph.—Rapport de la commission nommée par l'Académie de Médecine sur le plan de lutte contre le typhus exanthématique. [Proceedings of Exanthematic Typhus. Report of the Romanian Academy of Medicine.]

The first part of this report is historical and deals with the large epidemics of typhus which devastated Serbia, Galicia and Russia during the European War 1914-18.

The author considers that the morphological histopathological and immunological differences between typhus and spotted fever are so great that these two diseases as well as their causative organisms should be widely separated from one another and given definitely distinguishing names.

It is suggested that the well-established name *Rickettsia prowazekii* be applied to intracytoplasmic micro-organisms in Insecta causing all diseases of the typhus group and that *Dermacentorsonus rickettsii* (the name originally given by Wolbach) be applied to hereditarily transmitted micro-organisms invading nuclei in Arachnoidea and in tissue cultures causing all diseases of the spotted fever group. Specific varieties when established by the demonstration of definite and constant biological differences should be indicated by variety names as *Rickettsia prowazekii mooseri* (for endemic flea-borne typhus in all parts of the world) D H

BOYD (J S K) Classification of Typhus Fevers [Correspondence]
—*Trans Roy Soc Trop Med & Hyg* 1936 June 30 Vol 30
No 1 pp 131-133

At the recent discussion on typhus fever at the Royal Society of Tropical Medicine references were made to a paper by BOYD [see this Bulletin 1936 Vol 33 p 417]. As he points out in this letter the table in that paper was not intended to be a suggested classification but was an analysis according to serological findings of cases of typhus fever in India. This analysis allowed the cases to be placed in three sub-groups.

- 1 XK type = main agglutin corresponding to Japanese River fever
 - 2 X19 X2 type = group agglutinins corresponding to Rocky Mountain fever and boutonneuse fever
 - 3 X19 type = main agglutinin corresponding to endemic or murine typhus.
- D H

COVELL (G) & MEHTA (D R) Studies on Typhus in the Simla Hills Part IV The Role of the Rat Flea in the Transmission of Typhus.—*Indian Jl Med Res* 1936 Apr Vol 23 No 4 pp 921-927 With 1 chart [15 refs]

A hundred and twenty-one *Xenopsylla cheopis* were collected from wild rats caught in Sabathu in the neighbourhood of Kasauli where cases of typhus had recently occurred. These fleas were emulsified and injected intraperitoneally into a guineapig which developed fever and orchitis. This strain of virus has now been passaged for 17 generations out of 50 animals inoculated 38 developed orchitis and *Rickettsia* were readily demonstrated in smears from the scrotum. White rats which were inoculated with emulsion of brain from infected guineapigs developed agglutinins for *Proteus OX 19* in two instances up to a dilution of 1/1 000 no reaction was obtained with *OXK* or *OX2*. The reactions of laboratory animals to this strain of virus isolated from fleas were the same as were obtained with the virus previously isolated from wild rats captured in the same villages cross immunity tests were also positive.

Forty-six *X. cheopis* fleas were fed on a white rat which had been infected with the wild rat virus these fleas were fed for three days on a second rat but without result but later on the survivors of the same fleas were fed for nine days on a third white rat and this animal became

infected and guinea-pigs were infected from it. These animals developed fever and orchitis and Rickettsia were demonstrated also cross immunity experiments with this flea strain and the original strain were positive. Some of the fleas which were infected by feeding on this rat were taken and examined and the cells of the midgut were found to be crammed with Rickettsial bodies. No Rickettsia could be found in laboratory bred fleas. The author points out that he has now isolated a virus from the wild rats in Kasauli and also from fleas caught in wild rats. He also shows that the time of maximum prevalence of fleas coincides with the season when the greatest number of typhus cases occur.

[A point requiring explanation is why this virus isolated from rats and fleas produces agglutinins for OX19 only as do similar viruses elsewhere, whereas the serum of the cases agglutinates OXK.] D.H.

MERCIER (H.), FABRE & SOULAGE. Sur un cas de fièvre typho-exanthématique d'origine vraisemblablement murine observé à Marseille. [Case of Exanthematic Typhus, probably of Murine Origin, In Marseilles.]—*Marseille-Méd.* 1938, Mar 15, Vol. 73, No. 1, pp. 339-344. With 1 chart.

Many cases of boutonneuse fever have been reported in Marseilles but so far no cases of endemic typhus have been seen, although such have been reported from other Mediterranean seaports.

The patient was a soldier and was admitted to hospital from camp, the fever was severe, typhoid state, profuse rash on body but not feet but sparing the face. Well Felix reaction positive 1:500 at beginning of second week of fever and epididymitis on the 21st day of fever. The man was a storekeeper and his work brought him into contact with rats. Experimental proof of the exact nature of the virus was not possible.

D.H.

OLMER (D.), OLMER (J.) & AUDIER (M.). Les phlébitis de la fièvre boutonneuse. [Phlebitis in Boutonneuse Fever].—*Bull. Soc. Path. Exot.* 1938, May 13, Vol. 29, No. 5, pp. 457-459.

Although the authors have seen many cases of boutonneuse fever they have so far seen phlebitis only in two cases. In one of these cases the initial sore or tache noire was just over the right femoral vein and the phlebitis occurred in this region. It is suggested that the phlebitis in typhus fever may be due to the Proteus organism and not to the virus itself.

D.H.

COVELL (G.). Studies on Typhus in the Simla Hills. Part V. Attempts to establish Strains of Typhus from Human Sources.—*Indian J. Med. Res.* 1938, July, Vol. 24, No. 1, pp. 139-147. (With refs.)

In a previous paper the author has recorded the isolation of strains of typhus virus from wild rats and rat fleas in Kasauli, Punjab. The rat strain has now been passaged for 35 generations and the strain from rat fleas for 31 generations. Rabbits and white rats inoculated with these strains gave a positive Well-Felix reaction for OX19 and negative for OXK and OX2.

The present paper deals with the isolation of typhus virus from human cases. Only a few cases of typhus occurred during the year and

of these only four were admitted to hospitals. Blood from three of these cases was inoculated into guineapigs in all the three patients the Weil-Felix reaction was positive for OXK but negative for OX19 in the first case the blood was taken on the 11th day of the fever and in the second case on the 9th day Two guineapigs were inoculated intra peritoneally and both developed fever the virus was passaged for four generations and was then lost. One of the guineapigs was killed during the fever and the brain examined definite typhus lesions were detected around the small blood vessels None of the guineapigs developed orchitis and Rickettsia could not be found in smears from the tunica.

In Case 3 the blood was taken on the 10th day of fever and inoculated into a guineapig fever developed on the 8th day and the virus was passaged for seven generations and then lost scrotal reaction (slight) was noted on one occasion. Emulsion of the spleen of an infected guineapig (passage virus) was inoculated into the anterior chamber of the eye of a rabbit. An iridocyclitis resulted and this virus was successfully passaged in the eyes of rabbits for four generations and then lost but Rickettsia could not be found in Descemet's membrane.

Monkeys inoculated with the virus showed little or no signs of illness but one gave a positive Weil Felix reaction for OXK Of 29 rabbits inoculated 6 gave positive reactions for OXK and all were negative for OX19 in the positive reactors there was a rising and a falling titre of agglutination.

It will be noted that there was a marked contrast between the action of these viruses obtained from the human cases and the rat virus previously isolated the latter caused a severe and prolonged fever in guineapigs with scrotal reaction and numerous Rickettsia could be readily found in smears from the tunica also the sera of rats and rabbits yielded a marked positive reaction for OX19 On the other hand the virus from cases of typhus caused only slight fever in guinea pigs without any scrotal reaction and Rickettsia could not be definitely identified in smear preparations this virus could not be established in laboratory animals and the Weil Felix reaction was positive only in low dilutions and for OXK not for OX19

D H

LEWTHWAITE (R.) & SAVOOR (S. R.) Recent Work on the Typhus-like Fevers of Malaya.—*Trans Roy Soc Trop Med & Hyg* 1936 Apr 8. Vol. 29 No 6 pp 561-571 [16 refs.]

This paper read before the Royal Society of Tropical Medicine and Hygiene gives an account of some of the work carried out by the authors in Malaya on the typhus group of fevers rural typhus tsutsugamushi fever and urban typhus most of this work has already been published and has been reviewed in the *Bulletin*.

The principal results obtained are grouped under five headings— (1) Demonstration of the rickettsial nature of the viruses of all three members of the tropical typhus group in Malaya (2) The relationship of the three diseases to each other and to Rocky Mountain fever (3) Search for the carriers of rural typhus and urban typhus (4) Evidence as to the reservoir of the viruses (5) Attempted inoculation of guinea pigs against experimental infection with rural typhus.

The findings are as follows—

1 Rickettsia could be demonstrated in all three diseases in rural typhus and in tsutsugamushi fever they were seen in the cells of

Descomet's membrane in the eye and resembled in morphology *R. orientalis* of Japanese workers. Rickettsia seen in smear preparation from the tunica of guinea-pigs infected with urban typhus on the other hand resembled *R. prowazekii*.

2. Complete cross immunity exists between rural typhus and tsutsugamushi fever in Malaya and the viruses of these two diseases when injected intradermally in rabbits and monkeys produce a primary site. There is no cross immunity between the viruses of urban and rural typhus or between rural typhus and Rocky Mountain fever.

3. Urban typhus in Malaya, as elsewhere, is carried by the rat flea but the rat flea is not the vector of rural typhus although it can be infected experimentally. Two species of tick *Dermacentor reticulatus* and *Rhipicephalus sanguineus* were experimented with but no evidence could be obtained that either species of tick could transmit or even acquire the virus of rural or urban typhus.

4. Experiments have shown that the wild rat is a reservoir of the virus of rural typhus—two strains of this virus were isolated from rats and when inoculated into rabbits produced agglutinins for O.I.K. and produced fever and ascites in guinea-pigs.

5. All attempts to protect guinea-pigs, by vaccination with formalized brain tissue of animals infected with the virus of rural typhus, failed.

In the discussion which followed Dr. FELIX pointed out that killed virus from the arthropod vector is superior to killed virus from mammalian tissue for immunization. Dr. FLECHNER is convinced that few if any cases of typhus occurred in Malaya before 1924. Colard SHORR referred to recent work by COVELL and himself in Kweilin. His opinion is also that typhus is a new disease in that locality. Dr. LITZEN compared conditions in Indo-China with those met with in Malaya. He agreed that rural typhus and tsutsugamushi fever are probably one and the same disease.

D.H.

LITZEN (P.) & LORENDO (N.). Etude d'un foyer de typhus endémique d'origine marine. [Endemic Typhus associated with Rats in Athens.]—Bull. Soc. Path. Exot. 1936, Mar 11, Vol. 29, No. 1 pp. 285-285 With 4 figs. [10 refs.]

Endemic typhus was first reported in Athens in 1931 and since then in one small area in the city and in the same houses in that area case have been reported every winter whereas in other parts of the city only a few isolated cases have been discovered. This particular section of the city is a "slum area" consisting of small dilapidated houses built over the ruins of the ancient city. These sites are being gradually excavated by antiquarians and as the houses are removed the people that lived in these houses are concentrated more and more in the remaining houses and with them is concentrated the rat population. These rats find plentiful harbourage in the underground wells, pits and cellars of the ancient historical ruins. A notable increase of rats in some of the houses was observed after the destruction of a military bakery which had been accommodated in a disused Turkish mosque.

It is undoubtedly this aggregation of people and rats which has caused the outbreaks of typhus fever each cold season. In one group of refugees living in this area in very crowded conditions in thatched-down rat infested huts no cases of typhus occurred among the adults but several cases were met with in the children. On enquiry it was

ound that in Asia Minor where these people had come from the older people had suffered from typhus and were immune the children born since arrival in Athens contracted fever. The cases were typical of endemic typhus and the Weil Felix reaction OX19 was positive up to a dilution of 1/4 000 strains of murine virus were isolated by injection of the blood of the patients into the spermophile (*Citellus*) an animal which the authors find to be more susceptible than the guineapig and the virus remains viable in the brain for long periods.

The strains of virus isolated from the rats and from the cases of fever were proved to be identical. Although many mice were captured in the buildings none was found to be infected. *D H*

VAUCEL (M.) Recherche du typhus murin au Tonkin [Research on Murine Typhus at Tonking].—*Bull Soc Méd Chirurg Indochine* 1936. Feb Vol. 14 No 2 pp 251-280 With 16 charts
— Recherche du typhus murin au Tonkin.—*Bull Soc Path Exot* 1936 May 13 Vol. 29 No 5 pp 542-550

A hundred and thirteen rats captured in Hanoi in 1934 were examined and all were negative. In 1933 154 rats were examined and from the brains of these animals nine viruses were isolated on further examination of these nine only one gave definite tests for typhus : e. fever scrotal reaction in guineapigs and cross immunity with a known typhus virus. A typhus virus was also obtained from the brains of rats captured in other areas in Tonking. The author points out that the local murine virus does not give so constant or definite scrotal reactions in male guineapigs as do viruses described in other countries and owing to the slight fever produced and difficulty of establishing the virus cross immunity test could not be satisfactorily completed. *D H*

TOUILLE (F.) & RIOU (M.) Quelques cas de typhus endémique contractés au Tonkin [Endemic Typhus contracted in Tonking].—*Bull Soc Méd Chirurg Indochine* 1936 Feb Vol. 14 No 2 pp 288-299

Seven cases of typhus are described in detail in one case *Bact typhorum* was isolated by blood culture but the Widal reaction was negative and the Weil-Felix reaction was positive up to 1/1 000. In the other six cases the Weil Felix reaction was also positive. A rash was seen in two only of the cases and in these was mild and transient. The only constant symptom in all the cases was a very definite fever which lasted from 2 to 3 weeks. Blood was taken from one of the cases and injected into guineapigs but without result. *D H*

MASSIAS (Charles) Typhus tropical bénin. Typhus endémique en Cochinchine. [Benign Tropical Typhus in Cochin-China].—*Rev Méd et Hyg Trop* 1936 Jan.-Feb Vol. 28. No 1 pp 38-49 [19 refs.]

This paper gives an account of cases of typhus previously described in Indo-China and Cochin-China in the present paper a mild case of fever is reported which occurred in the Cochin-China delta. There was no rash, no eruption and no primary sore but the serum of the patient agglutinated OXA up to a dilution of 1/100. *D H*

MOUSTAZ (R.) Cas de pseudo-typhus type Schüffner observé en Cochinchine, fièvre boutonneuse? Fièvre frivale du Japon? [Pseudo-Typhus or Schüffner Type in Cochin-China, Boutonniere Fever? Japanese River Fever?].—Bull. Soc. Path. Exot. 1936, May 11, Vol. 29, No. 5, pp. 551-559.

Five cases are described.

No history of bite of tick in any infection was possibly due to ticks. A primary ulcer was noted in 2 only out of 5 but swollen glands in all. Incubation period 5 days. Clinically the cases resembled boutonniere fever but as LERREZ pointed out in the discussion there is no true immunity between boutonniere fever virus and Japanese River fever virus.

D. H.

VAN WAARDENBURG (D. A.) Over vier gevallen van Rickettsiose bij residentie Bentkoelen. [Four Cases of Rickettsia Infection at Bentkoelen Residency].—Generaal Tijdschrift v. Med. Indië 1936, Mar. 24, Vol. 76, No. 12, pp. 712-721.

Clinical details of four patients are briefly stated and more fully the results of their blood examination and serological tests. The first was a European 39 years old his serum reacted with Proteus XII b: dilution of 1:100 on the 7th day of illness, 1:800 on the 20th. The second was a Javanese 30 years he gave agglutination of Proteus XII 1:50 on the 12th day 1:600 on the 19th. The third, also a Javanese, aged about 50 years gave a negative with Proteus XII but a positive 1:100 with the Hungarby strain [day of illness not known for certain, he had felt ill for several days] and a week later 1:800 against the same strain. The last a Batakan, reacted with Proteus XII 1:100 on the 20th day and 1:800 on the 27th. Thus three were infected with ship-typhus and one with scrub-typhus it is worthy of note that two of the three were out-door workers.

H. H. S.

TOUILLE (F.) & RIOT (M.) Le typhus marin. [Marine Typhus].—Bull. Soc. Méd. Chirurg. Indo-Chine 1936, Feb., Vol. 11, No. 2, pp. 281-287.

A general discussion of endemic typhus with reference to the role of the carrier the reservoir diagnosis, clinical course in man with therapeutic treatment.

D. H.

- i HUGHES (J. C.) DIETHLEM (O. A.) & TEBBUTT (A. H.) Australian Typhus, with a Report of a Fatal Case.—Ibid. 11, December, 1936, Mar. 7, 23rd Year, Vol. 1, No. 10, pp. 327-329.
- ii. TEBBUTT (A. H.) & WAARDEN (D. A.) Australian Typhus with Recovery.—Ibid. pp. 330-331. With 1 chart.

i. The first case of endemic typhus was notified in N. South Wales in 1927 since that year 27 cases have occurred in the northern districts of the State and in Sydney. Three cases are reported which occurred among people who worked in a rat infested warehouse two of these cases gave a positive Weil-Felix reaction and one case was fatal at post-mortem haemorrhagic consolidation of the lung (infarction?) was noted with enlargement of the spleen. [See paper by MATTHEW below].

ii. The author reports a case of fever with rigor, macular rash and drowsiness no enlargement of spleen the patient was a woman living

in a good locality but the house next door had been recently pulled down and rats had invaded her house.

Blood culture was sterile and the Widal reaction negative on the 11th day the Weil-Felix reaction was positive in a dilution of 1/160 for OX19 but was negative for OXK D H

MATHEW (R. Y.) Notes on a Fatal Case of Endemic Typhus — *Health Canberra*. 1936 Mar Vol. 14 No. 3 pp 24-28

In this case the incubation period could be definitely fixed at 13 days fever was high and a macular rash was noted, the patient developed the typhoid state and died on the 12th day. The Weil Felix reaction negative at first became positive later but only in a dilution of 1/80 for OXK. At the post mortem a haemorrhagic consolidation of one lung was found with enlargement of the spleen a similar condition has already been noted in fatal cases of Australian typhus. Three guinea pigs were inoculated with emulsion of the brain of this case one of these developed fever which lasted for 8 days with loss of weight and scrotal swelling diplococcal bodies were found in the scrotal fluid

D H

DUBIEUX (C.) Présence à Dakar d'un virus typhique murin. [Murine Typhus Virus in Dakar]—*Bull Soc Path Exot* 1936 Mar 11 Vol. 29 No. 3 pp 228-230

In the port of Dakar which is connected by rail with Casablanca where cases of typhus have been reported, rats were captured during the summer of 1935 47 of these were killed and emulsions of brain in batches of 7 were inoculated into guineapigs. A virus was isolated which produced fever and scrotal swelling in all guineapigs in which it was passed. This virus was tested against the virus previously isolated in Casablanca and complete cross immunity was demonstrated. Four cases of fever were reported and the sera of these people were tested during convalescence all gave a high positive Weil-Felix reaction

D H

VAN SLYPE (W.) & BOUVIER (G.) Sur l'existence de la fièvre boutonneuse dans les régions de Luputa et de Port Franqui [Boutonneuse Fever in the Luputa and Port Franqui Districts of Belgian Congo]—*Ann Soc Belge de Méd Trop* 1936 Mar 31 Vol. 16 No. 1 pp 143-148.

In 1933 a case of suspected boutonneuse fever was reported in this district of the Belgian Congo. It was therefore decided to carry out an investigation on the following lines —(1) inoculation of dog ticks into guineapigs (2) study of the Weil Felix reaction in local dogs. Seventy five ticks were collected emulsified and injected into guinea pigs with negative results. The sera of 100 dogs tested were also negative.

D H

MOREIRA (João Affonso) & DE MAGALHÃES (Octavio) Typho exan themático de Minas Geraes. [Typhus in Minas Geraes]—*Brasil-Médico* 1936 Aug 22 Vol. 50 No. 34 pp 727-731 With 5 charts.

In previous communications (see this Bulletin 1935 Vol. 32 p 157 1936 Vol. 33 p 40) the authors dealt with certain aspects of typhus in

Minas Geraes and described experimental work in connexion therewith. It seemed unlikely that all cases should be severe; that is, there was great probability that mild cases were occurring but escaped observation. Examination of suspects was therefore undertaken in three directions. (1) To test the protective power of serum of patients, whether febrile or not. (2) To test the Weil-Felix reaction. (3) To observe the results of inoculation of guinea-pigs with the isolated virus. The second of these has proved of high diagnostic value in Minas Geraes. Details of one series are given, those examined being member of the household of a man who had died of the disease, viz., the mother, 3 brothers and a sister of the deceased, and the husband of the last. All gave a positive Weil-Felix, 1/40-1/100 except the husband (1) with O\K and H\K the other two tests giving negative results.

H. H. S.

- I. PLOTZ (Harry) & GRUOUD (Paul). Culture des rickettsies de typhus exanthématique [Cultivation of Rickettsia of Exanthematic Typhus].—*C. R. Soc. Biol.* 1938. Vol. 122. No. 23. pp. 883-884
- II. — & — Culture des rickettsies de la fièvre boutonneuse [Cultivation of Rickettsia of Boutonniere Fever].—*Ibid.* pp. 884-885

i. The method adopted was that of Nigg and Landsteiner. Small portions of the tunica of normal guinea-pigs were placed in vials of guinea-pig serum 1 part + Tyrode's solution 2 parts, 10 to 20 pieces of tissue in 3 cc. of the fluid in 25 cc. flasks. As Plotz has already shown it is necessary to exclude air from the flasks by means of rubber bungs or caps as when serum is used if air is admitted CO₂ is lost and the medium becomes alkaline. The flasks are incubated at 37°C. for 10 days and the inoculum is small pieces of the testicle of infected guinea-pigs. Rickettsia were seen in films made from the cultures and guinea-pigs were infected by small doses of the cultures. These animals were immune when tested later. True typhus virus was subcultured 5 times and a murine virus 22 times.

ii. This virus was isolated in 1934 from a case of boutonniere fever and has been passaged in guinea-pigs since then. Two strains of the virus have been cultivated by the method described in the previous paper, one has been successfully subcultured 7 times and the other 5 times. Rickettsia were seen in cells in the cultures and also in groups outside of the cells. Inoculation of 1 cc. and 0.5 cc. of the culture produced fever in guinea-pigs and even 1/1 000 cc. of culture fluid produced fever but after a prolonged incubation period. These animals were afterwards proved to be immune. Inoculation of culture jets to rabbits produced a positive Weil-Felix reaction.

D. H.

- NIGG (Clara). Studies on Culture Strains of European and Murine Typhus.—*Jl. Experim. Med.* 1938. Mar 1. Vol. 61. No. 1. pp. 341-351

The cultures used in these experiments were made in tunica-serum-Tyrode medium as described in previous papers by the same author. The usual inoculum was from an emulsion of the tunica of guinea-pig infected with European or murine virus. The actual viruses were European virus (Breinl) which had been cultured through 36 generations.

over a period of 1½ years in the laboratory, a murine typhus virus which had been cultured through 82 generations during a period of 4 years.

It was noted that when observed over a long period the numbers of Rickettsia present in cultures of the two series were approximately equal, and when inoculated into guineapigs from time to time little or no variation in virulence was noted in either strain. It was also noted that when employing cultures of the European virus for inoculation of guineapigs scrotal reaction was more common than when brain from passage animals was employed due probably to the greater numbers of Rickettsia in the culture material but after the 19th generation culture the scrotal reaction was not greater than usual. The evidence of these culture experiments indicated that the murine strain of typhus virus has a definite predilection for tunica tissue and that the reaction is due to this property rather than to the numbers of Rickettsia injected thus small doses of emulsion of brain of guineapigs infected with the murine strain produced marked scrotal reactions whereas large doses of brain of guineapigs infected with European virus produced little or no reaction.

D H

GNUTENKO (M) & FRÖAUF (V) La cultivation du virus du typhus exanthémique épidémique en association avec des Sarcines. [Cultivation of the Virus of Epidemic Typhus in association with Sarcinae]—*Rec Microbiol Épidémiol et Parasit* 1935 Vol. 14 No 4 [In Russian pp. 325-337 With 5 charts. [28 refs.] French summary pp. 337-338.]

Emulsion of brain of a guineapig infected with typhus virus was inoculated into tubes of broth containing yeast cells and these tubes were incubated a Gram-negative bacillus was isolated from one of these cultures morphologically resembling a *Proteus* bacillus. This bacillus was agglutinated by the serum of typhus cases to the same degree as was the laboratory strain of *Proteus XI9*. The serum of rabbits which had been inoculated with this bacillus agglutinated the homologous bacillus and the laboratory strains of *Proteus* to the same dilutions.

D H

BALTAZARD (M.) Multiplication des virus exanthématiques dans les tissus. [Multiplication of Typhus Virus in the Tissues]—*Bull Soc Path Exot* 1936 Apr 1 Vol. 29 No 4 pp 403-411 With 2 figs.

Boutonneuse fever—Intradermal injection of the virus of boutonneuse fever in guineapigs produces an inflammatory reaction and definite multiplication of the virus at the site of injection the virus is present in the lesion from the 2nd to the 7th day. Histological examination shows that at first lymphocytes plasmocytes and polynuclear cells are present but later on definite nodules consisting of groups of histiocytes can be seen around the blood vessels and Rickettsia can be seen in the cells later still necrosis occurs.

Virus of murine typhus—Similar results are obtained with this virus a tache noire is produced by intradermal injection. The virus of Rocky Mountain fever did not produce any local reaction nor could the virus be recovered from the site of injection the same is true of the virus of true epidemic typhus.

D H

- I. BRIGHAM (George D). A Strain of Endemic Typhus Fever isolated from the Brain of a Wild Rat.—*Public Health Rep.* 1936, Mar. II, Vol. 51, No. 13, pp. 337-339.
- II. — Susceptibility of the Opossum (*Didelphis virginiana*) to the Virus of Endemic Typhus Fever.—*Ibid.* pp. 333-337 With 4 figs.

I. A case of typhus was discovered in a small grocery store in Alabama which was rat-infested. Rats (*R. norvegicus*) were captured and killed and fleas (*A. chropterus*) removed. The fleas were emulsified and injected into guinea-pigs without any result. Emulsion of the brains of the rats was injected into guinea-pigs and fever resulted with swelling of the scrotum. This virus was passed for 3 generations and was also injected into rabbits; the Weil-Felix reaction became positive. Rickettsia were found in smears from the tunica of guinea-pigs and typical typhus lesions were demonstrated in the bracts.

Cross immunity tests were positive with a local strain of endemic typhus virus and with a strain of European epidemic typhus (Brazil).

II. A strain of the virus of endemic typhus obtained from local rats was utilized and an opossum was inoculated intraperitoneally with testicular washings from an infected guinea-pig. There was no fever and no symptoms and the animal was killed on the 10th day after the inoculation (no p.m. sign). Emulsion of the brain was injected into guinea-pigs and fever and scrotal reaction resulted. Cross immunity tests with this virus and the local virus were positive, and the brains of infected guinea-pigs showed typical typhus lesions. The serum of rabbits inoculated with the opossum virus gave a positive Weil-Felix reaction.

D. H.

MARUYAMA (Seguru). Experimentelle Untersuchung ueber die Ansteckung von Flecktyphus durch die Nasenhoehle und den Verbreitungsweg desselben im Koerperinneren. [Experimental Research on Infection with Typhus through the Nasal Cavity and its Mode of Spread to Internal Organs].—*J. Oriental Med.* 1938, June, Vol. 24, No. 6. [In Japanese pp. 1183-1216. With 1 plate 3 charts & 1 fig. [15 refs.] German summary pp. 67-68.]

The author finds that the virus of typhus can pass through the nasal mucous membrane of the nose in guinea-pigs. Investigation of the infected animals showed that the virus could be recovered from the lymph glands draining this area and from other glands and also from the brain and spleen. The presence of the virus in these organs was demonstrated by inoculation of emulsions into the testicle of normal guinea-pigs.

D. H.

BLANC (Georges) & BALTAZARD (Marcel). Longevit  de virus du typhus murin chez la poule (*Xenopsylla cheopis*). [Longevity of the Murine Typhus Virus in the Flea (*X. cheopis*)].—*C. R. Acad. Sci. Paris* 27, Vol. 202, No. 17, pp. 1461-1463.

Laboratory bred fleas (*A. chropterus*) were fed on infected rats, then removed and placed in glass bottles; clean rats were placed in the bottles.

and left for 48 hours and then removed and the fleas were returned to the bottle the fleas were changed to a clean bottle every 10 days. There were 48 hours between the feeds on rats. The rats were killed from time to time and emulsions of brain injected into guineapigs also emulsion of the fleas was injected at intervals. It was found that fleas were still infective up to 100 days. The experiment started on 23rd December with 635 fleas and finished on 30th May with 35 fleas.

D H

BLANC (Georges) & BALTAZARD (Marcel) L'influence du jeûne sur le développement du virus du typhus murin chez la puce (*Xenopsylla cheopis*) [Influence of Fasting on the Development of the Murine Typhus Virus in the Flea (*X. cheopis*)]—*C. R. Acad. Sc.* 1936. June 29 Vol. 202. No 26 pp 2191-2192.

Fleas were fed on an infected rat for 24 hours then starved for 12 days. They were then found to be non infective the fleas were again fed for 48 hours and became infective.

The authors consider that the ingested virus does not multiply until a second blood feed. [A similar phenomenon has been noted with ticks and Rocky Mountain fever virus.]

D H

- i. EPSTEIN (G W) & SILVERS (I L.) Transmission of Rat Virus to Guinea Pigs through Fleas. Second Preliminary Report.—*Giorz di Bacteriol e Immunol* 1935 May Vol. 14 No 5 pp. 1079-1088. With 1 fig
- ii. — — — & EXEMPLARSKAYA (E V.) Searching for Typhus Virus in Moscow Rats (Winter 1934) Third Report.—*Ibid* pp 1089-1098

i. Three hundred and seventy-one wild rats were captured in Moscow and 1,375 fleas collected from them 3.7 fleas per rat 1,081 fleas were utilized in the experiments and 82 per cent. of these were *X. cheopis* 18 per cent. *Cer. fasciatus* 412 fleas were fed on guineapigs and 245 were utilized to provide suspension of intestine for inoculation into 18 guineapigs in some instances the fleas were first fed on the guineapig then killed and the intestines removed and emulsified and inoculated. In 11 groups both methods were successful. Emulsions of the intestines of 10 to 30 fleas were utilized and groups of 8 to 35 fleas were fed on the guineapigs. In one instance an emulsion of only 10 intestines produced infection and 53 per cent. of the experiments gave positive results. All these successful results were obtained with *X. cheopis* no success with *C. fasciatus*.

The rats from which the fleas were taken gave a positive Weil Felix reaction and all the infected guineapigs had fever and scrotal swelling. Rickettsia were demonstrated in smears from the intestines of the fleas and from the tunica of infected guineapigs. One conclusion was that the virus is more concentrated in the flea intestine than in the rat brain.

ii. In the winter of 1934 the same experiments were repeated but without any success many of the experimental animals died of pneumonia but there was no evidence of typhus infection. 237 rats and 842 fleas were employed.

D H

- i. BALTEANU (I.) & CONSTANTINESCO (N.) Réaction de Weil-Felix chez les rats sauvages de Roumanie. Présence d'un virus marin. [Weil-Felix Reaction in Wild Rats of Rumania. Presence of a Marine Virus.]—*C. R. Soc. Biol.* 1938, Vol. 121, No. 11, pp. 1427-1430.
- ii. — & — Virus marin isolé à Jassy Réceptivité des animaux de laboratoire. Sensibilité de l'homme. [Marine Virus of Jassy. Receptivity of Laboratory Animals. Sensitivity of Man.]—*Ibid.* pp. 1430-1433.
- iii. — & — Virus marin isolé à Jassy Dispersion et persistance dans l'organisme routes d'élimination et routes d'infection. [Marine Virus of Jassy. Dispersion and Persistence in the Organism, Routes of Elimination and of Infection.]—*Ibid.* pp. 1434-1436.
- iv. — & — Sur un virus marin de fièvre exanthématische isolé à Jassy (Roumanie) [Murine Typhus Virus isolated at Jassy (Romania)]—*Bull Acad Md Rumanie*, Paris, 1938, Vol. I, No. 3, pp. 518-539 With 5 figs.

i. One hundred and twenty-one rats were captured in the town of Jassy in Rumania and in villages in the neighbourhood where cases of endemic typhus had occurred. The blood of 104 of these rats was tested for the Weil-Felix reaction against emulsions of OXK and grouped according to the results.

Group I	7 rats	1/200 to 1/600
II	33	1/30 1/100
III	59	negative

43 per cent of the rats examined gave a positive result.

The rats were killed and the brains emulsified and injected into guinea-pigs. Of the 121 examined 110 gave negative results.

Four strains of virus were isolated from groups of rats, only one of these strains was established in guinea-pigs this particular strain called Dana, was isolated from a group of 4 rats captured in Jassy at a flour mill of that name. These rats were from Group I above in which the Weil-Felix reaction was positive in 1/200 to 1/600.

ii. In this paper the reactions of the strain of typhus virus in experimental animals are recorded.

In white rats this strain produced high fever and many of the infected animals died. In wild rats fever was produced and loss of weight occurred. In mice the strain produced a fatal disease all the infected animals died. Both in white rats and wild rats and also in the dog the Weil-Felix reaction became positive. In the spiny-tail only an unapparent infection resulted but the brain was infective for guinea-pigs for long periods.

The virus was passed in guinea-pigs for many generations extinction made of the brains of these animals in the first few generations when inoculated into men produced typical attacks of mild typhus but when the infective material was taken from guinea-pigs later in the series no fever was produced but the blood of the patient was infective for guinea-pig. Material taken still later in the series produced neither fever nor any infection the Weil-Felix reaction was positive in the human cases of fever.

iii. In guinea-pigs this strain of virus produced fever only without any excreta reaction, nor could Rickettsia be discovered in serum from

the tunica. The incubation period was usually about 3 days and fever lasted from 6 to 11 days there was loss of weight and 50 per cent. of the animals died. Those that recovered from the infection were immune to further inoculations with the same virus but so far as one can discover no cross immunity tests with known strains of typhus virus were attempted.

iv The information contained in this is the same as that given in the three preceding papers. D H

BALTEANU (I.) & CONSTANTINESCO (N.) Sur la nature du virus murin de fièvre exanthématische isolé à Jassy [Nature of the Murine Typhus Virus isolated at Jassy]—*C R Soc Biol* 1936. Vol. 122. No 21 pp 702-704

The reactions of this murine virus as regards its action on animals have already been described.

It was found that the virus could resist cold for 50 days and that up to 5 days bile had no effect on it. In 50 per cent. glycerine the virus was viable for 25 days but not after 60 days.

Filtrability—Five times out of 8 trials the virus passed through a Seitz filter it was partially retained by a Chamberlain L2 filter and completely retained by L3 D H

BLANC (Georges) & NOURY (M.) Sur un microbe du type Proteus X19 isolé du sang d'un malade atteint de typhus murin [Bacillus of Proteus X19 Type isolated from Blood of Man infected with Murine Typhus]—*C R Soc Biol* 1936 Vol 121 No 15 pp 1572-1573

A freely mobile non-Gram-staining bacillus was isolated from the blood of a case of endemic typhus. This bacillus did not ferment lactose or liquefy gelatine but produced acid in glucose and saccharose and acid and gas in maltose the iodole test was positive. Both H and O varieties were isolated. The O type was agglutinated up to a dilution of 1/6 000 by the serum of the case of fever D H

CONSTANZI (Carlo) Note istologiche intorno a tre casi di febbre erattiva.—*Policlinico* *Soc. Med.* 1938 Apr 1 Vol. 43 No 4 pp. 175-204 With 11 figs. [38 refs.]

LEATHWAITE (R.) & SAVOOR (S. R.) The Typhus Group of Diseases in Malaya. Part IV the Isolation of Two Strains of Tropical Typhus from Wild Rats.—*Brit. Jl Experim Path* 1936. June. Vol. 17 No. 3 pp 203-214

It has already been shown by the authors and others that agglutinins for OXK and for OX19 can be found in the sera of wild rats in Malaya.

The authors have succeeded in isolating a rural typhus virus from the local wild rat this virus produced fever and scrotal swelling in guinea pigs but only agglutinins for OXK in rabbits. The virus of rural typhus does not as a rule produce scrotal swelling in guinea-pigs and in this instance the authors consider that the symptom was caused by

secondary infection with the spirillum of rat-bite fever. The typical ocular reaction was obtained in rabbits, and rickettsia resembling *R. orientalis* could readily be demonstrated in the cells of DeMere's membrane. Of 42 rabbits inoculated with this virus (Rat 5) 27 gave positive reaction 18 of these gave a reaction with OXK and 8 with OX19 1 gave reactions for both. Cross immunity was complete in rabbits against the viruses of rural typhus and typhus fever derived from human cases.

D. H.

LAWTHWAITE (R.) & SAVOOR (S. R.). The Typhus Group of Diseases in Malaya. Part V. The Well-Felix Reaction in Laboratory Animals.—*Brit. Jl. Experim. Path.* 1938. June. Vol. 17 No. 3 pp. 214-228. [12 refs.]

This highly technical paper is a report of the inoculation of rabbits and monkeys with the viruses of rural and urban typhus and the results of the Well-Felix reaction. Both living and alcohol treated emulsions of Proteus were employed the sera of 310 normal animals were first tested with the following results—

With OXK 90 per cent. of the normal sera gave negative results and with OX19 98·4% as a result of these tests it was decided that with OXK a titre of 50 or over would be taken as positive whereas with OX19 a titre of 1/25 or over would be taken as positive. Blood was drawn from the test animals before inoculation and at intervals of 5 days from the 10th day onwards.

Rural typhus virus.—Of 27 rabbits inoculated intraperitoneally 18 gave positive results and all with OXK. Two rabbits inoculated intraocularly with the blood from two cases of rural typhus both gave positive Well-Felix reactions with OXK. Of 24 rabbits inoculated intraocularly with passage virus 10 were positive all with OXK.

Virus of typhus fever.—One rabbit inoculated intraperitoneally gave a positive (OXK). Of 8 rabbits inoculated intraocularly with the virus from cases of fever two gave a positive reaction, and of 57 inoculated by the same route with passage virus 34 gave a positive reaction with OXK.

Virus of urban typhus.—Of 8 rabbits inoculated intraperitoneally 4 gave a positive reaction with OX19 and of 55 inoculated intraocularly 30 gave a positive reaction all for OX19.

Two strains of rural typhus virus isolated from wild rats were also tested these gave positive reactions in rabbits for OXK in the same proportion of the animals whatever route was employed. It was noted also that small doses of virus, say 0·1 cc. when inoculated into the eye of rabbits produced a much higher response than did larger doses, 6-10 cc. inoculated intraperitoneally. It was also noted that the ocular reaction in rabbits may be positive and often is, though the Well-Felix reaction is negative. Only 50 per cent. of rabbits inoculated give a positive with rural typhus virus, whereas with louse-borne typhus virus practically all give a positive reaction.

Monkeys—rural typhus virus.—One gibbon inoculated with the virus of rural typhus gave a positive reaction for OXK 1/170 on the 21st day and a positive reaction for OX19 on the 15th day this phenomenon is discussed later. Three *Macacus* monkeys all gave a positive reaction for OXK and negative for OX19.

Change of type of antibody response.—In one case of rural typhus fever the serum of the patient gave a positive reaction in mice and

falling titre both for *OX19* and for *OAK* the *OX19* agglutinins appearing earlier on the 11th day of the fever the actual result was *OAK* 1/1 100 and *OX19* was 1/1,900 this virus when isolated in guineapigs gave the definite reactions of a true rural typhus virus i.e. no scrotal reaction ascites and a 90 per cent. mortality in the animals and also gave the typical ocular reaction in rabbits with *R. orientalis* present in the cells When inoculated into rabbits all reacted with *OAK* but when inoculated into a gibbon the serum of this animal gave a positive reaction for both *OX19* and *OAK* just as the serum of the original patient had done This strain from the gibbon when inoculated into rabbits gave at first slight reactions for *OX19* and pronounced agglutinins for *OAK* but later passages in rabbits only gave agglutinins for *OAK*

There was definite cross immunity between this strain derived through the gibbon and the original human strain in guineapigs another gibbon *immune to rural typhus* gave no response when inoculated with this strain Three monkeys inoculated gave agglutinins for *OAK* and none for *OX19*

D H

PERCHIER (G) L'importance de la réaction de Weil Félix dans la prophylaxie du typhus exanthémique. [Value of the Weil-Felix Reaction in Typhus Prophylaxis.]—Ann Soc Belge de Med Trop 1936 Mar 31 Vol 16 No 1 pp 89-104 [26 refs.]

This paper is written in connexion with the recent epidemic of louse borne typhus in the district of Urundi in the Belgian Congo

It was found that it was not possible to diagnose cases of typhus from other fevers in natives on clinical grounds alone partly owing to the difficulty experienced in examining the natives and for other reasons for a diagnosis of typhus (which was essential before effective prophylaxis could be applied) it was necessary to rely on the results of the Weil Felix reaction A discussion on the nature of the Weil Felix reaction and the relation between *Proteus* and *Rickettsia* follows and the fact that the Weil-Felix reaction is not positive in other diseases is emphasized. The sera of over 2 000 local natives some of whom were healthy and some suffering from fevers sleeping sickness relapsing fever leprosy syphilis etc were tested for the Weil Felix reaction and all were negative. This opinion has to be modified for later in the paper it is stated that 13 per cent. of the 2 658 sera tested gave a positive reaction in a dilution of 1/160 therefore a titre of 1/320 was taken as positive. This was possible because the actual cases of typhus in Urundi all gave positive reactions in high dilutions even up to 1/50 000 Sixty per cent. of the cases gave a reaction in a dilution of 1/5 000 Some of the cases of typhus gave positive reactions for many months after the fever had ceased it was noted that this depended not so much on the severity of the fever but occurred in the cases from certain districts. For agglutination tests fresh emulsions of *Proteus* bacilli were utilized and a reading was made after 1 hour in the incubator a second reading 4 to 6 hours later and a third at 12 to 18 hours. In positive cases the titre was found to be doubled at the second reading

The difficulties of diagnosis were overcome by close collaboration between clinic and laboratory and prophylaxis based on this diagnosis was a complete success

D H

PASHCHA (C. L.) BANERJEE (K.) & LAL (S.). Immunological Methods in the Determination of Infection in a Random Sample of Hospital Admissions. Part II. (The Frequency and Concentration of Agglutinins for Proteus X Strains in a Series of Hospital Patients.)—*Indian Med. Gaz.* 1936 June. Vol. 71 No. 4 pp. 320-322.

The sera of 280 patients in hospital were tested against O antigen of A19, A2 and Xh. These people were all natives of India and were suffering from various diseases but none had typhus and none gave history of recent typhus infection.

The results were as follows —

	Number tested	1/25	1/50	1/100
		Percent.	Percent.	Percent.
X19	290	55.7	23.2	14
X2	259	11.2	2.7	—
Xh	77	68.6	29.8	7.8

D. H.

BLANC (Georges), NOURY (M.) & BALTAZARD (M.). L'état de pré-munition contre le typhus exanthémique chez l'homme. Sépt et double vaccination. [Preliminary to Exanthematic Typhus in Man. Single and Double Vaccination].—*Bull. Acad. N.F.* 1936 July 7 100th Year 3rd Ser. Vol. 116. No. 26 pp. 33-37 With 3 charts.

Thirty-four persons were inoculated with a bile treated virus there was no reaction in any of them and in none was there a positive Widal-Felix reaction the same virus, untreated produced a typical and attack of fever. Eight of these inoculated people were given a test dose of virus on the 12th day after inoculation there was no reaction whatever after a further 27 days they received another test dose and again did not react.

The authors consider that up to the 12th day protection is due to the presence of the virus in the body (premunition) and after the 12th day when the virus has disappeared protection is due to immunity produced by the vaccine.

D. H.

BLANC (Georges) & NOURY (M.). Le phénomène de pré-munition chez le cobaye au cours de l'infection typhique. [Phenomenon of Premunition in the Guinea-pig in Course of Typhus].—*C. R. Soc. Biol.* 1936. Vol. 122. No. 20 pp. 523-525

If guinea-pigs are inoculated with the virus of true epidemic typhus and on the 1st and 2nd day after inoculation are re-inoculated with the virus of murine typhus, they develop fever and scrotal swelling but if they are re-inoculated from the 3rd to 7th day fever follows but no scrotal swelling is seen and the fever is due to the true typhus virus only. If these animals which have been re-inoculated during the incubation period are killed during the period of fever only the virus of true typhus can be isolated from them.

D. H.

DONATIEN (A.) & LESTOQUARD (F) Existence de la prémunition dans la Rickettsiose naturelle ou expérimentale du chien. [Pre-munition in Rickettsiosis of Dogs.]—*Bull Soc Path Exot* 1936 Apr 1 Vol. 29 No 4 pp 378-383

The authors have already reported this Rickettsiosis of dogs which is carried by the dog tick *R. sanguineus*. The acute illness is severe and the disease is often fatal. Rickettsia can be readily demonstrated in the lungs and liver of sick animals by puncture during life, and in the brain post-mortem. The virus can be demonstrated in the animals for some months after the fever has ceased.

D H

CUCA (M) BALTEANU (I) & CONSTANTINESCO (N) Réceptivité du chat au virus exanthémique. Infection spontanée. Forme inapparente. [Susceptibility of the Cat to Typhus Virus Spontaneous Inapparent Infection.]—*Bull Acad Med Roumanie* Paris 1936 Vol 1 No 2 pp 271-274

— & — Contribution à l'étude épidémiologique du typhus. Réceptivité du chat au virus exanthémique. Infection spontanée inapparente.—*Arch Roumaines Path Expérим et Microbiol* Paris 1936 June Vol. 9 No 2 pp 283-297 With 14 figs.

A normal cat was fed on the tissues of an infected guineapig—the cat did not develop fever and the Weil Felix reaction was negative—the animal was killed on the 37th day of the experiment and emulsion of the brain injected into guineapigs. Typical fever developed and the animals were later shown to be immune to typhus virus. A second and third cat were treated in the same way and both became infected although neither had any fever or other symptoms of illness. Half of the brain of an infected guineapig was injected intraperitoneally into a cat but no fever followed although later the brain of the cat was proved to be infective.

Three cats were taken from houses where cases of typhus had occurred—these animals were killed and the brain emulsion inoculated into guineapigs and they developed fever. Three cats were procured from a district where no typhus cases had occurred and these animals proved to be non infective.

D H

BLANC (Georges) Histoire et enseignements d'une vaccination contre le typhus exanthémique faite à Petitjean (Maroc). [Typhus Vaccination at Petitjean (Morocco).]—*Rev d'Hyg et de Med. Préventive*, 1936, Apr Vol. 58 No. 4 pp. 252-272. With 10 figs.

Up to the present no fewer than 11,216 persons have been vaccinated with living lake-treated typhus virus by the author and his co-workers. In this paper details are given of the vaccination of the entire population of a town of 6,000 inhabitants in one day. At the time when these vaccinations were carried out cases of typhus were occurring in the town and in villages near at hand—no attempt at decontamination of the people or their clothing was made.

The method of the preparation of this vaccine has already been described but very full instructions are given in the present paper.

roughly the method is that infected guineapigs are killed on the spot and emulsions are made from the tunica, the spleen and suprarenal glands or bile to a strength of 5 per cent. is added to the emulsion and allowed to act for exactly 15 minutes then 1 cc. of the bile treated vaccine is inoculated under the skin. One guineapig supplies sufficient vaccine to inoculate about 1,000 persons.

The organization on this occasion was so complete that 8,234 persons were vaccinated in one day at a rate of about 30 per minute. Ten days later these fevers were probably due to the vaccine, which of course a living virus. The strain is a murine one which produces only very mild fever in man. Nine cases of typhus occurred among the vaccinated, these were cases of true louse-borne typhus and not murine typhus. Twenty-seven days after the vaccination there were no more cases of typhus among the vaccinated although cases continued to occur for some months among the people in the surrounding country who had not been inoculated. Although so many were inoculated with a living virus these people in no way formed a source of infection for others as the ectoparasites such as fleas and lice are unable to obtain the virus from the blood of those inoculated and these people rapidly acquire an immunity.

D.E.

GARD (A.) Sur les résultats de la vaccination contre le typhus exanthémique par la méthode de Georges Blaize (épidémie de Petrosaville).—Bull. Office Internat. d'Hyg. Publique 1936. Apr. Vol. 1.
No. 4 pp. 684-687

GIROUX (Paul) Comportement du virus du typhus histolytique à Tunis au cours de la carence et de la précarce C. [Behavior of the Histolytic Typhus Virus (Tunis) in relation to Normal and Deficient Diets.]—C. R. Soc. Biol. 1936. Vol. 121 No. 1 pp. 714-715

Guineapigs were fed on a diet which had been deprived of vitamin C. These animals were then inoculated with the virus of epidemic typhus, the majority of the animals developed an acute and severe fever but when the strain was passed to animals on a normal diet no abnormal symptoms were noted.

GIROUX (P.) Action de la carence C sur l'immunité acquise chez les cobayes infectés de typhus exanthémique. [Influence of C on Acquired Immunity to Typhus in Guineapigs.]—Bull. Soc. Path. Exot. 1938. Apr. 1 Vol. 29 No. 4 pp. 373-378.

The authors took 30 guineapigs which had been previously inoculated with typhus virus and had recovered. These were divided into two groups, one group was fed on an ordinary diet and the other group on a diet deficient in vitamin C. All the animals were then given a dose of a typhus virus, none reacted, but from two of the animals on C deficient diet the virus was recovered from the brain. This argues that deficiency of C may give rise to latent infections in protected animals and that this may in part explain the association of typhus epidemics with famine.

KAWAMURA (Kazuo) Verification of Virus (Rickettsia) in the Urine of Patients and Guinea Pigs infected with Typhus Fever in a Broad Sense.—*Jl Oriental Med* 1938 May Vol. 24 No 5 [In Japanese pp 1051-1063 With 1 plate English summary p 75]

The urine of patients suffering from typhus was injected intraperitoneally into guineapigs and these animals became infected if the urine was taken in the first week of the fever. The urine of infected guinea pigs was also proved to be infective for other animals when injected intraperitoneally.

D H

LE CHUTTON (F), BERGE (Ch.) & PENNANÉAC H (J) Inoculation au cobaye par la voie testiculaire de sang de malades atteints du typhus endémique bénin de Toulon. Recherche de l'immunité des touches isolées vis-à-vis d'une souche murine [Testicular Injection into Guineapigs of Blood from Individuals with Benign Endemic Typhus of Toulon. Immunity Tests with Viruses Isolated vis-à-vis a Murine Strain.]—*Bull Soc Path Exot* 1936 June, 10 Vol. 29 No 6 pp 632-638.

The blood of 16 cases of typhus from cruisers in Toulon Harbour was inoculated into the testicle of guineapigs. The clinical diagnosis was established in all the cases and the Weil Felix reaction was positive. 3 cc. of the blood was inoculated intraperitoneally and 1.5 cc. into the testicle the guineapigs were observed for 24 days and fever usually commenced from the 8th to the 13th day. By the intratesticular route 11 times a strong positive reaction 4 times a mild reaction 1 negative. By the intraperitoneal route 2 gave a strong positive 5 gave a mild reaction 2 of the guineapigs died 7 were negative.

D H

ZIA (Samuel H.) & WU (Chao Jen) Serum Treatment of Experimental Typhus.—*Chinese Med Jl* 1938 Feb Supp No 1 pp 270-274 With 4 charts.

The authors obtained a supply of anti-typhus horse serum from Professor ZINSSER. Doses of 1 cc. of this serum were given to guinea pigs at intervals of 48 hours after infection with the local (Peiping) strain of typhus virus there was definite evidence of protection. When a single dose of 2 cc. of serum was given the results were still better. Even when the fever had commenced before the dose of serum was given there was some evidence of protective power—a milder infection with shorter duration of the fever.

D H

FLIPPIN (Harrison F) Rocky Mountain Spotted Fever in Pennsylvania.—*Amer Jl Med Scs* 1938 May Vol. 191 No 5 pp 685-689 With 1 fig & 1 chart.

The author describes a typical case of Rocky Mountain fever eastern type which occurred in Pennsylvania the patient was a woman aged 45 who two weeks before the fever developed had removed and crushed the ticks from her pet dog. A profuse general rash which involved also the palms of the hands and soles of the feet is illustrated. [The

excellent photos illustrating this point remind one of those already published of cases of boutonneuse fever]. The Weil-Felix reaction was positive for $\lambda 19$ and $\lambda 2$ in a dilution of 1/200 negative for λK .

D. E.

MAXCY (Kenneth F.) The Weil-Felix Reaction of the Rabbit in the Diagnosis of Rocky Mountain Spotted Fever [Eastern Type].—*J. Infect. Dis.* 1936, May-June, Vol. 53, No. 3, pp. 28-32. [10 refs.]

The Weil-Felix reaction is usually relied on for the diagnosis of Rocky Mountain fever—but for various reasons it may not be possible to obtain serum—for instance in fatal cases the agglutinins may not have had time to develop. Maxcy therefore has employed the method of inoculating the blood of cases of fever into rabbits and testing the Weil-Felix reaction of the serum of the rabbits later. Eight cases have been tested in this way. Emulsions of formalized non-toxic $\lambda 19$ and $\lambda 2$ pure O varieties are employed and the macroscopic method used. The emulsion and dilution of serum are kept for 4 hours at 5° and then in the refrigerator overnight at 4°C. In order to obtain a positive reaction it is essential that the blood should be taken from the patient before the 8th day of the fever. 3 cc. of citrated blood is injected intra-peritoneally into the rabbit within one hour of withdrawal from the patient. For a positive reaction to be recorded it is necessary that there should be rising and falling titre of agglutination in the rabbit serum. Of the 8 cases 2 were fatal. 6 of the 8 rabbits developed agglutinins 4 for $\lambda 19$ and 2 for $\lambda 2$. The agglutinins rapidly disappeared from the blood of the rabbits. The two failures are accounted for by the fact that in one instance the case was very mild and the blood was not taken until the 8th day—in the other case the blood, owing to mistake, was kept for 4 hours after withdrawal before inoculation.

D. E.

KURODA (Osamu) Experimentelle Studien über eine heterologe Reaktion bei Tsutsugamushi-Krankheit. [Experimental Study of an Intracutaneous Reaction in Tsutsugamushi Disease].—*Ztschr. Bakteriol. I Abt. Orig.* 1936, Mar. 24, Vol. 136, No. 3, p. 172. [23 refs.]

The author refers to earlier work in which emulsions of infected larvae were used as antigen for intradermal injection for diagnosis of typhus cases—later on emulsions and filtrates of *Proteus* (λ) larvae were employed for the same purpose.

The author has utilized filtrates of $O\lambda K$ for intradermal injection for diagnosis and prognosis in tsutsugamushi disease. He considers that λK is not merely a variant or mutant of $\lambda 19$ but is a distinct individual germ differing morphologically, biologically and serologically from $\lambda 19$.

These filtrates were injected intradermally into healthy young men and in 100 per cent. of cases a positive reaction resulted after an incubation period of one or two hours—occasionally in children and in men a negative result is obtained.

The test was employed also in people suffering from fever, typhoid, tuberculosis etc. and all gave a positive result.

In tsutsugamushi fever in the first few days a positive reaction was obtained but after the 6th or 7th day a negative reaction resulted and his negative condition persisted for at least a month and often longer in very severe cases the positive reaction could be obtained till later in the fever. It is on this point that the author relies for aid in prognosis. Various experiments were carried out on rabbits and guineapigs and with the antisera prepared from rabbits or obtained from convalescents the results of these experiments show that the reaction is a true allergic reaction.

D H

DENGUE AND SANDFLY FEVER.

HANSON (Henry) An Epidemic of Dengue.—*Amer Jl Public Health*
1936 Mar Vol. 26 No 3 pp 256-258.

This paper contains an account of an epidemic of dengue in Florida which was controlled by an active campaign directed against the breeding places of *Aedes aegypti*. In contrasting the measures required when dealing with prevention of yellow fever it is pointed out that in yellow fever there is a solid and lasting immunity whereas after dengue immunity is only partial and may only last for a few weeks.

If dengue breaks out in a community in which dengue has not occurred for some years it is necessary not only to reduce the number of mosquitoes but to remove them entirely whereas in yellow fever in a community where immune people are present reduction of numbers of mosquitoes may be sufficient to check the disease entire elimination is not essential.

In Miami the city was divided into 50 districts and an inspector and staff were appointed for each district.

The author emphasizes the necessity of providing trained workers for supervision inspection of areas in which relief workers had been employed revealed numerous breeding places which had been overlooked.

The container born mosquitoes must be reduced to zero to check dengue even a more intense campaign than is required to stop yellow fever.

D Harvey

HANSON (Henry) Some Observations on Dengue.—*Amer Jl Trop Med*
1936 May Vol. 16 No 3 pp 371-375

This is an account of the prevention and stamping out of dengue by means of antilarval methods a previous paper by the same author is summarized above.

A favourite site for breeding *A. aegypti* is in old motor tyre covers 112 tyres in one heap were all found to be breeding places.

As already pointed out by the author it is necessary to reduce the number of mosquitoes to zero in order to stamp out dengue whereas in the case of yellow fever reduction of numbers may be sufficient.

D H

SOFIEV (M. S) [The Blood-feeding Habits of Sandflies.]—*Bull Inst Epidemiol & Microbiol Tashkent*. 1935 Vol. 3 No 1 pp 52-55 [In Russian.]

Using the sera of man horse donkey sheep ox dog rat and frog the author employed the precipitin reaction to determine the nature of

the blood ingested by sandflies caught in Tashkent. The results of the examination of 496 sandflies were as follows—

Species of <i>Phlebotomus</i>	Total No examined	Reaction positive	Reaction negative	Per cent. positive to human blood
<i>papiferum</i>	367	196	171	52.5
<i>chinensis</i>	48	23	24	56.3
<i>sergenti</i>	23	18	10	53.3
<i>caucasicus</i>	32	14	18	57.1
<i>major</i>	1	1	0	0
<i>borealis</i>	1	0	1	0
Undetermined	18	8	11	(?)

It is seen that more than 50 per cent. of the species of sandflies commonly found in Tashkent feed on human blood, from which it can be assumed that they are equally anthropophilic and zoophilic in their feeding habits.

C. A. Hart

LEPROSY

Doull (James A.) Rodriguez (José N.) Guinto (Ricardo) & Planilla (Fidel C.) *A Field Study of Leprosy in Cebu.*—*Internal Jl Leprosy* Manila, 1936 Apr-June Vol. 4 No 2 pp 141-170 With 4 text figs & 11 figs. on 3 plates

The Philippine Island of Cebu has only one twelfth of the total population but has produced one-quarter of the registered lepers so a portion of it was selected for a field study of the distribution of the disease. A skin dispensary had previously been started to gain the confidence of the people, and very few of them objected to a practically complete examination of their bodies for lesions with special reference to household and family infections. The climate is humid the people poor and the diet mainly of fish. No less than 5,987 of the 8,083 registered population were seen or 98.3 per cent. and 104 leprosy cases, or 1.72 per cent. were found or if apparently quiescent or arrested cases are excluded 1.34 per cent. including 30 or 29.0 per cent. unknown previously to the Bureau of Health but only 3 of these were bacteriologically positive against 43 under previous control. A study of the location of the first lesions confirmed Rogers and Muir's statement that a large proportion 91 per cent. occur on the extremities exposed to injury. The age distribution supported the view that early infection is the rule and that males suffer most in adult life, but not in childhood. This is most readily explained by greater exposure of males to infection after childhood. Previous contact with a leprosy patient, at least as intimate as sleeping in the same house was met with in 38.5 per cent. and family contact in 26 per cent. In all but two instances the antecedent leper is known to have been bacteriologically positive. House overcrowding predisposed to infection especially as regards sleeping accommodation. There was no serious deficiency of vitamin B as beriberi was rare. Yaws is very prevalent but no difference was found in the leprosy incidence of yaws infected and other families and no relation to the prevalence of other skin diseases. If a similar relationship between the segregated and the total cases obtains in the rest of the Philippines the total would be about 20,000

L. Rogers

Holland (E. M.) *Leprosy in New Guinea.*—*Internal Jl Leprosy* Manila, 1936 Apr-June Vol. 4 No 2 pp 171-176 With 1 fig

A few lepers were known in this area in 1914 a focus was found in the Madang District in 1926 the author found 32 cases in New Ireland in 1928 and by 1935 there were 547 such patients with an incidence of 11 per mille in New Ireland, 59 per mille in New Hanover and 200 per mille in the earliest infected villages mostly mild, for 90 per cent. were nerve cases. In 10 per cent. the lesions appeared in childhood and the majority about puberty or early adult life. These data were obtained by trained patrolling officers examining the whole population completely every few months. Treatment by alepol and moogrol has cleared up 52 of 546

L. R

MACKENZIE (J. Noble) A Note on Leprosy Work in Korea.—*Journal of Leprosy* Manila, 1936. Apr-June. Vol. 4. No. 2. pp. 215-218.

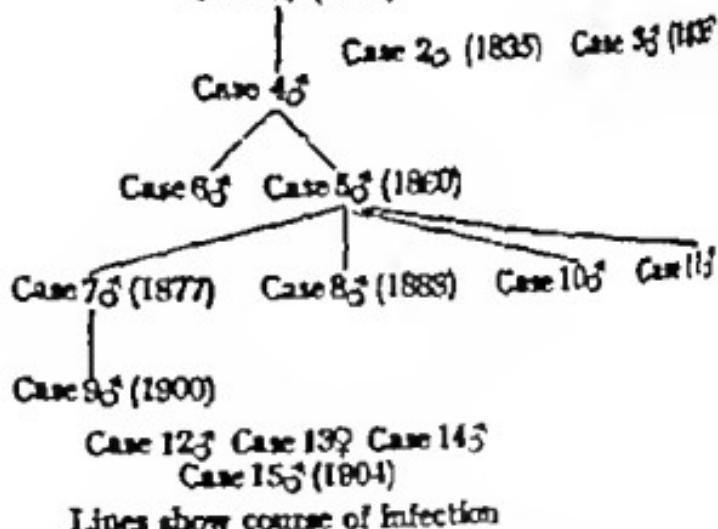
The well-known institution at Fusan in Korea now has almost 500 patients and 22 children of lepers. The case mortality has been reduced by injections of *hydnocarpus* oil with 1 per cent. creosote from 35 to 2 per cent. and 60 to 70 recovered patients are being discharged annually. The Japanese Government have recently notified that all leprosy institutions must be registered under the rules for the isolation of infective diseases. At present not more than 6,000 of the estimated 20,000 in Korea are hospitalized. The author thinks that the greater proportion of known male to female lepers is due to the latter being going and the disease at bay longer.

L. K.

LEPROSY REVIEW 1936. July Vol. 7 No. 3. pp. 101-122. With 9 figs. & 1 map on 6 plates & 2 diagrams.—Quarterly Publication of the British Empire Leprosy Relief Association, 138 Baker Street London W.1. (2s.)

A report on leprosy in the Cayman Islands by the Medical Officer (unnamed). The disease is stated to have made its appearance about 1825 and its subsequent history is recorded, with the following interesting diagram tracing the infection of fifteen cases from one patient to another down to 1904.

Georgetown

Case 1^d (1825)

West Bay Case 12^d Case 13^d Case 14^d
 Case 15^d (1904)

Lines show course of infection

An abstract of the report of Fiji for 1934 states that in the leper island of Makogai the cases from various British Pacific Islands receive treatment and care unsurpassed in the world. [This affords a good example to the isolated efforts of the smaller British West Indian Islands.] The incidence in different islands varies from one to two per cent. of the population. The admissions numbered 89, half of them nerve cases only two with deformities and none advanced cutaneous ones. This is due to the importance of early diagnosis and treatment being now realized by doctors and patients. The standard treatment is weekly intramuscular injections of chaulmoogra oil with 0.5 per cent. of iodine, warmed and kept in a thermos flask or in glass vessels standing in hot water to reduce its viscosity and this much cheaper preparation

gave as good results as ethyl esters. Recoveries numbered 29 in the year. The patients do much towards growing their food supplies, including fowls and their eggs. In spite of damage by storms about 100 *H. Wrightiana* trees supply about three pints of oil, but the *H. antehumulica* are less healthy and have not yet borne fruit.

Brief reports from several British African Colonies are also summarized in this issue

L. R

BINFORD (C. H.) The History and Study of Leprosy in Hawaii.—*Public Health Rep.* 1936 Apr 10 Vol. 51 No 15 pp 415-423 With 4 figs. on 2 plates.

This note relates the oft told tale of leprosy in the Sandwich Islands and the prolonged attempts to reduce it by means of compulsory isolation the influence of which is said to have been very doubtful. L. R

LEPROSY IN INDIA. 1936 Apr Vol. 8 No 2 pp 43-91 With 6 figs. on 3 plates. Issued quarterly by the Indian Council of the British Empire Leprosy Relief Association.

The only original paper in this number is an address to the Mission to Lepers Conference in Calcutta on February 6th 1936 by Dr J. LOWE on Modern thought on Leprosy and its bearing on Mission work in India. He considers that although no one advance of major importance has been made recently yet a number of bits of knowledge put together have greatly altered for the better the aspect of the leprosy problem. The optimism regarding treatment that began about twenty years ago has been replaced by a swing of the pendulum, perhaps too much in the other direction. The isolation of infectious cases particularly from young children is of prime importance. In Japan separation of children from their parents and sterilization of patients are regarded as very important measures. Quality rather than quantity of measures should be aimed at. Further investigations on treatment and epidemiology are required. The mission leprosy institutions are making a valuable contribution to anti leprosy work in India. L. R.

MAXWELL (James L.) The Task before us.—*Chinese Med. Jl.* 1936 May Vol. 36 No 5 pp 716-720

This is an address on very similar lines to the above on the leprosy position in China, where the problem is a most difficult, but not an insoluble one. Surveys to throw light on the distribution and epidemiology of the disease are urgently needed. It must be made clear to our legislators that penal laws are no more suitable for leprosy than for any other disease and that the use of force will tend to spread not to limit leprosy." He advised the formation of a Council on Leprosy by the Chinese Medical Association L. R.

MORA (A. Damas) & SOARES (J. C.) Leprosy in Macao Some Comments by the Portuguese Doctors in Macao—*Chinese Med. Jl.* 1936 May Vol. 50 No 5 pp 721-725

According to this account the Portuguese established an asylum for lepers in the Chinese port of Macao as early as 1569 and at the beginning of the 17th century the inmates numbered about 70. In 1830 a (cont)

D

separate new institution was built for women, but it could not be completed because no one would take on the work when the contacts developed leprosy. Among 150,000 people police search discovered 50 to 60 patients who are receiving the usual treatment. L.R.

PEREIRA (Lotola) Contribution to the Study of Leprosy in Goa.—Reprinted from *Med. Digest.* 1936. Mar. Vol. 2 No. 2 pp. 540-542. With 1 chart.

This brief note records that the age incidence of leprosy in Goa found to be higher than usually reported. For only 16·66 per cent showed the first signs by the age of 20 years, nearly one-fourth at 7 to 35 more than half between 21 and 40 years of age, and two-thirds between 21 and 45. L.R.

ROSEA (James Rose) Occupation and Leprosy.—*J. Med. Inst. India* 1936 June 13. 23rd Year Vol. I No. 24 pp. 815-816. [Hed.]

HUKWITZ (Ezra) & ANDERSON (Hamilton H.) Leprosy in Panama: First Thirty Years of Segregation.—*Arch. Jl. Trop. Med.* 1936 May Vol. 16 No. 3 pp. 353-369. With 1 chart. [Hed.]

Since 1904 320 leprosy patients have been segregated in Panama, all of whom were born in other areas of the Caribbean and only three not born in the Canal zone. Only 33 children have been admitted. Fifteen arrested cases prefer to remain in the colony. None of the 15 uninfected persons employed in the colony up to as long as twenty years show any signs of leprosy. Forty-four patients have been passed by a board of three members. 142 have died, 18 abandoned, 15 have been repatriated and 12 readmitted since 1904. Taberculosis and nephritis were the commonest causes of death, as usual. The average age of onset was 31 years and the duration of the disease on entering the colony 3·7 years. The duration of the disease in the present group of 108 has averaged 9·64 years to date. Esters are now being used mainly intradermally. Cases improving under chaulmoogra therapy show lower unsaturation and higher total lipoids in their blood than those who are quiescent or deteriorating. L.F.

MEDEDDELINGEN VAN DE DRIEST DIER VOLKSGEZONDHEID IN HET LANDSCH. IND. 1936. Vol. 25 No. 1 pp. 1-85—[15 pgs]
on Leprosy in the Netherlands Indies.]

SUTAKALA (J. B.) & KOMAT (R.) Leprosy-Untersuchungen auf Java.—[Leprosy Investigations in Java].—*Arch. f. Dermat. u. Syph.* 1936 May 15 Vol. 174 No. 2 pp. 143-165. With 8 figs.
— Leprabekämpfung.—[Leprosy Control].—*Ibd.* pp. 165-169.

This series of papers on leprosy in the Dutch East Indies is largely of local interest. The most important is one on the present Government policy. In 1897 they accepted the finding of the first International Leprosy Conference in favour of the principle of compulsory segregation but it has never been legally enforced, and a Bill of 1925 making it possible was rejected. In 1930 the Leprosy Commission of the League of Nations at Bangkok under the heading of "Principles of the regulations of leprosy" concluded "In the present state of knowledge regarding leprosy prophylaxis the most important line of attack is

addition to that by isolation is by treatment—where efficient treatment is possible segregation may be made less rigorous on the condition that it is supplemented by out patient treatment. The Manila Leprosy Conference of 1931 endorsed this principle and the leprologists assembled at Manila regarded the compulsory segregation of lepers to be a merely secondary consideration. The Netherland Indies Government officially recognized this new course of action in 1930-31 and a program drawn up by SITANALA is now being put into practice under him. The Queen Wilhelmina Jubilee Foundation is employing its funds on scientific leprosy research in a special institute and a leper section and laboratory have been established in a Central Civil Hospital. Early cases are sought out and treated especially in the young. Infective cases are being isolated locally at the expense of their communities. In short modern methods based on recently acquired knowledge are being adopted.

Surveys have shown 3 per mille cases in Celebes 3 to 9 per mille on Small Kei Island and up to 17 per mille in mountain villages. L R

GERMOND (R. C.) A Study of the Last Six Years of the Leprosy Campaign in Basutoland.—*Internal Jl Leprosy Manila* 1936 Apr-June. Vol 4 No 2 pp 219-224 With 3 figs.

This paper adds little to the recent one of P D STRACHAN (this Bulletin 1936 Vol 33 p 295). The addition of further trained inspectors is believed to mark the beginning of a new and more hopeful era for the admissions increased steadily between 1929 and 1933 with a slight decrease in 1934. More important there has been a great shortening of the duration of the disease before admission for in 1924 in only 31 per cent. was it one year or less and in 37 per cent over two years against 57 and 25 per cent. respectively in 1934. The great majority of new cases now belong to the milder neural and tuberculoid forms. L R

WAYSON (N E) The Early Diagnosis of Leprosy. The First Clinical Findings observed in Segregated Children of Leprous Parents.—*Internal Jl Leprosy Manila* 1936 Apr-June. Vol 4 No 2 pp 177-188 With 8 figs. on 2 plates.

This is an interesting account of the closely observed earliest symptoms in 108 children nearly all of whom had been removed from their leprous parents at birth or soon after. Their ages varied from a few months to sixteen years and thirty five of them were found to exhibit at some time one or more of the changes that are considered to be possibly early signs of leprosy but which may disappear again in some cases. X rays may be helpful in detecting early bone changes. Of the 35 the suggestive changes in 25 have so far failed to develop any sensory disturbances or any combination of changes which would justify a definite diagnosis of leprosy but 10 have developed such changes. One a boy of ten is positive bacteriologically with typical skin and nerve lesions.

Among the remaining nine cases the following clinical findings have been obtained either at the first examination or subsequently in the numbers of patients indicated. Lagophthalmos, 8 droop of an angle of the upper lip 8 atony or slight atrophy of the muscles of the interosseous spaces or of the thenar or hypothenar eminences 8 (1931)

paresis or paralysis of the lumbrical or interosseous muscles of the hand, 1 thickened nerve trunks or branches, amicular tibia or peroneal (in one case) supraclavicular 9 trophic disturbances, dryness or chydrosis, scaliness, glossiness or wrinkling, in one or more areas of the skin other than in definitive lesions, 5 sensory disturbances in one or more areas of the skin without definitive lesions, 5 circumscribed or definite skin lesions (macules) 4 sensory changes in one or more macules.

The diagnosis was only made in these from a combination of findings including sensory disturbances. In four of the nine typical bacilli were demonstrated after several attempts.

L.R.

LEVKOU (G.) & DES ESSARTS (J. Quérangal) Contribution au diagnostic des faux lépreux. Les macules de vitiligo. [The Diagnosis of Lepra-like Conditions. Leucoderma.]—*Bull. Soc. Path. Exot.* 1938. May 13 Vol. 29 No. 5 pp. 459-464.

This note deals with the differentiation of leprosy lesions from leucoderma. Stress is laid on the absence of anesthesia, and lepra bacilli in the latter or any thickening of the skin that can be felt with the eyes shut, as well as the absence of any inflammatory changes microscopically.

L.R.

TAJIMA (Isamu) Leprosy and Childbirth.—*Internat. J. Leprosy* Manila. 1938 Apr-June. Vol. 4 No. 2 pp. 189-194. Fig. 4 figs on 1 plate.

It is commonly held that leprosy is liable to become aggravated during pregnancy and in the puerperal period, but few actual data are available on the subject. The author furnishes these in relation to the birth of 112 children to leprosy infected mothers in the Okuyama National Leprosarium of Japan. His conclusions are well summarized as follows—

1. Of 112 lepromatous women at Aobel-en who have had children, 39 (34 per cent.) developed the disease during pregnancy or shortly thereafter.

2. In 100 pregnancies that occurred in women with leprosy exacerbation of the disease occurred 43 times, the remaining 57 being uneventful in this respect.

3. Though the initial symptom of leprosy is usually a simple麻疹 or anesthesia, the symptoms that appear in pregnancy or childbirth are usually acute lesions, the so-called "rash," often appearing as numerous active macules and frequently with edematous, erysipelas-like swelling of the face.

4. In the case of abortion there usually is little advance of the disease, though occasionally a case becomes worse in spite of it.

5. It is evident that for women who are in the incubation stage of leprosy, pregnancy and childbirth are liable to precipitate the development of the disease, and for those who have leprosy childbearing is apt to lead to its exacerbation and extension.

L.R.

BERNY (H.) Quel est l'avenir des enfants nés de mères lépreuses? [The Future of Infants born to Leprous Mothers.]—*Bull. Soc. Path. Exot.* 1938. May 13 Vol. 29 No. 5 pp. 469-471.

GIRARD in 1933 showed that only very early separation from their leprosy mothers will save infants from infection. His researches in Molokai met with no infections among 108 infants rapidly removed after birth from the leper colony but of those who lived in contact with their

mothers no less than 56 per cent. became infected. HOLMANN reported 4 per cent. of infections after 4 years 8 months and 15 per cent. after 7 years 6 months residence with their infected mothers. The author records that three infants removed at birth from mothers suffering from fully developed nodular leprosy remained healthy but 40 per cent. of ten infants remaining with such mothers developed the disease, and two of four infants of earlier dermal leprosy patients were also infected. On the other hand three infants of nerve type mothers remained healthy.

L R.

ALEIXO (A.) Lepra e traumatismo [Leprosy and Trauma].—*Folha Med* 1936. July 15 Vol. 17 No 20 pp 277-285 With 3 figs [59 refs.]

The author discusses the subject from several aspects and includes a few illustrative cases showing how the disease in a state of latency may be unmasked (*desvendada*) by injury at a site where there are no apparent lepromous lesions and where the bacilli cannot be found secondly how injury of a lepromous lesion in which bacilli are known to be present may extend the infection locally and by the lymphatics bring about wider diffusion thirdly accidents or complications ocular conditions deformities of the extremities may be attributed to the trauma when they are in reality due to the leprosy itself [this may be so primarily but it would not be easy to differentiate the part played by trauma on a site perhaps anaesthetic owing to the leprosy] Lastly the situation and nature of a lesion may lead the physician to a diagnosis of leprosy where no bacilli can be demonstrated to confirm this and further investigations show the non-lepromous nature of the condition. Two or three examples of this are given one of which may be cited where a man sustained an injury to his right hand which resulted in anaesthesia of the ulnar aspect of the hand and of the fingers. He presented himself with an ulcer of the thumb which started in an injury 8 days previously. Leprosy was strongly suspected but no bacilli could be found and both lesions were explicable by trauma alone.

H H S

JUNIOR (Rabello) Sarcoide de Boeck leprogenico [Boeck's Sarcoid in Leprosy].—*Rev Brasileira Leprologia* S Paulo 1936. June. Vol. 4 No 2. pp 123-138 With 19 figs [35 refs.]

Is Beuster Boeck's disease a condition distinct aetiologically from leprosy? The author is of opinion that at present it would be premature to give a categorically positive reply. It might possibly be due to a virus as yet unknown producing epithelioid granulomata resembling tuberculomata in tending to caseation and lepromata by their neurotropism. Meanwhile the following epitomizes our present knowledge of the subject.—

- 1 In leprosy sarcoid lesions of the skin and other tissues occur
- 2 Leprosy seems with peculiar frequency to determine the site of these granulomata.
- 3 In leprosy a rhinitis may be set up indistinguishable from sarcoid of the same site and bacilli may be looked for in vain [this would seem rather begging the question. If the two here are not distinguishable how can the author maintain that there are two conditions resembling each other ?]

4. Leprosy is in a very large proportion of cases (the author sees 95 per cent.) associated with indolent adenopathy analogous with sarcoids and histologically similar.

5. Pulmonary and bony lesions occur in leprosy radiograph indistinguishable from sarcoids.

6. Leprosy even in its florid forms is accompanied by common allergy to tuberculin and the same holds good in the so-called Besnier Boeck disease [there is no reason why both should not react to tuberculin].

7. Leprosy especially the tuberculoid forms, benefits from sulphonamides as does sarcoid.

H H S

PANJA (Ganapati). Two Cases of Leprotic Abscess—Calcutta Med J. 1938 Apr Vol. 30 No. 10 pp. 605-606. With 1 fig.

MUIR (E.) & CRATTERJI (S. N.). A Study of Nerve Leprosy.—Jour. II Med. Res. 1938 July Vol. 24 No. 1 pp. 179-218. With 8 plates.

This illustrated study of the history and clinical conditions, with pathological and bacteriological examinations of portions of nervous tissues, in eighty-one cases of leprosy cannot better be summarised than in the authors own conclusions. It should be read in its original by all interested.

" 1. Bacilli enter and pass up nerve branches from the neuro-vascular plexuses of the skin. This may or may not, be accompanied by distinct skin lesions. Either the local branches, or the distant main nerves, or both, may show clinical changes. Bacilli lie in close connection with neuro-vascular plexuses in the skin and subcutaneous tissue. The nerve bundles form a specially favourable medium for the growth of *M. leprae*.

" 2. Bacilli are carried up the nerves from the skin by the lymphatic vessels. They tend to accumulate at points of obstruction.

" 3. The neurotropism of *M. leprae* is discussed. This is shown to be at least partly connected with the comparative absence of cellular response to the bacilli in the nerves.

" 4. The endothelial cells of the capillaries take the most important part in the response to *M. leprae* in both the skin and the nerves. In the latter the bacilli are isolated from the endothelial cells of the ordinary placed capillary by the medullated nerve fibres and thus may escape phagocytic destruction. In the skin the bacilli lie in close proximity to the endothelial cells, and are thus more liable to be phagocytosed.

" 5. The effects of varying degrees of cellular reaction to lepra bacilli in the skin and in the nerves are discussed, especially with regard to the formation of nerve abscesses.

" 6. Apart from the degree of local concentration of bacilli, there are three factors which account for varying degrees of resistance and cellular response to *M. leprae* viz. specific resistance, general health and allergic reaction.

" 7. The course of events is traced in the formation of cutaneous and nerve abscesses—the forms which nerve abscesses assume are described and discussed in relation to their effect on nerve functions.

" 8. The nerves form an important reservoir for bacilli when they can multiply until sufficient tolerance is produced to overcome the greater resistance in the skin. This is followed by spreading of the bacilli to other nerves, and frequently by generalised infection.

" 9. Pain and other symptoms are relieved in suitable cases by excision of the nerve sheath of thickened nerves, opening of abscesses and extraction

of diseased nerve branches. A distinction is made between primary and secondary anaesthesia.

" 10 Recovery reaction is distinguished from allergic reaction

L. R.

GRIECO (Vicente) Estudo clínico e histológico de um caso de nevrite hanseniana tuberculoide com caseificação e ulceração (abcesso de nervo) [Clinical and Histopathological Study of a Case of "Nerve Abscess" in a Leper]—Rev Brasileira Leprologia S Paulo 1938 June, Vol. 4 No. 2 pp 151-201 With 35 figs. [18 refs.]

This is a very minute and detailed study of the case of a leper 24 years of age with a lesion in the lower third antero-external surface of the right leg. The lesion consisted of two ulcers about 4 cm. apart and on the dorsum of the foot was an anaesthetic macule. The ulcers were in relation to the musculo-cutaneous nerve this nerve-branch was thickened and passed on to the site of the macule. In addition to chaulmoogra oil treatment surgical intervention was undertaken and the nerve extirpated from the upper level of the swelling down to the macule. Now a year later there has been no further sign of the disease.

A large number of serial sections was made stained and examined, and all stages could be made out from an early proliferation of histiocytes and lymphocytic infiltration among the nerve fibres to the advanced stage of caseation.

H H S

Hoffmann (W H) Lepra und Bananen. [Leprosy and Banana].—Muench Med Woch 1938 May 8, Vol. 83 No. 19 pp 775-776

Anxiety has been expressed concerning the possibility of leprosy infection being acquired in Germany through imported bananas.

The author considers the question and comes to the conclusion there is absolutely no basis for such an idea.

L. R.

Katz (J R.) Biological Study of 'R' and 'S' Forms of Chromogenic Acid Fast Bacillus from Human Lepromatous Lesion.—Proc Soc Experim Biol & Med 1938 Apr Vol. 34 No. 3 pp 303-306.

The author has studied the variations in the colonies of an acid fast bacillus isolated from a subcutaneous leprosy nodule and cultivated by the method of Duval. He separated 'S' or smooth from 'R' or rough forms. The 'S' forms show smaller moist colonies are acid fast rods with 2-5 small granules which he considered to be signs of degeneration. The 'R' forms show larger wrinkled dry colonies grow more rapidly form a flaky suspension and are more thermostable. They also show mainly large bipolar granules resembling a spore stage and the bacilli are surrounded by a thicker capsular zone. Both forms may remain pure on subculturing over several months but the 'S' form may revert to the 'R' during adaptation on artificial media and it must be assumed that they are reversible. The 'S' is considered to be the typical and the 'R' the mutant form. L. R.

VILLELA (Gilberto G.) CASTRO (Almir) & ANDERSSON (Jeanette F. D.). Lipemia na lepra. [Lipæmia in Leprosy].—Rev Brasileira Leprologia. S Paulo. 1936. June. Vol. 4 No. 2 pp. 111-121. With 3 graphs. [21 refs.]

The authors examined a hundred lepers showing the cutaneous, tuberculous and mixed forms and ranging in age from infancy to 40 years, and both white and coloured patients. They found that total lipids and fatty acids were above the normal in all, whereas the cholesterol was in general lowered. Neither the type of disease nor the treatment influences the lipæmia to any appreciable extent. As a general rule the whites showed higher levels than the coloured patients. H. H. S.

VILLELA (Gilberto G.) CASTRO (Almir) & ANDERSSON (Jeanette F. D.). Blood Lipid Studies in Leprosy.—Jl. Trop. Med. & Hyg. 1936. June 1 Vol. 39 No. 11 pp. 126-127

VILLELA (Gilberto G.) & CASTRO (Almir). Le cholestérol et ses fractions dans le plasma des lépreux.—C. R. Soc. Biol. 1936. Vol. 121 No. 23 pp. 433-435

ANDERSSON (R. J.) CROWDER (J. A.) NEWMAN (M. S.) & SMITH (F. H.). The Chemistry of the Lipids of Tubercle Bacilli. XLII. The Composition of Leprosin.—Jl. Biol. Chem. 1936. April Vol. 113. No. 3 pp. 637-647. XLV. Isolation of a new Leprosol.—Ibid. June. Vol. 114 No. 2 pp. 431-438.

These two highly technical papers are best summarized in the authors own words.—

XLIII. "Leprosin, a neutral wax-like substance isolated from the leprosy bacillus has been analyzed and found to consist of a complex mixture of solid glycerides and waxes.

"The fatty acids liberated on saponification were myristic, palmitic, stearic, tetracosanoic acids and a new hydroxy acid called leprosinic acid.

The neutral portion of leprosin after saponification consisted of both water-soluble and ether-soluble components. Glycerol was the only water-soluble substance that could be detected.

"The ether-soluble unsaponifiable matter consisted of two highly secondary optically active alcohols. The less soluble alcohol was identified as α -eicosanol 2. A second alcohol, probably α -octadecanol 2, was also isolated."

XLV. "Two new alcohols, α and β -leprosol, having phenolic properties have been isolated from the unsaponifiable matter of the second fraction from *Bacillus leprae* and some of their properties have been determined." L. R.

CHOMON (V.) & CHOCQUE (O.). La cholestrine sanguine dans la Ratte murine. [Cholesterine in Leprous Rats].—C. R. Soc. Biol. 1936. Vol. 122 No. 21 pp. 621-624

Most workers have reported finding a decrease in the cholesterol in the blood of leprosy patients, but MARCHAND found it normal in early cases and BORGATTI found it to be increased. The authors have therefore investigated the changes in the case of rats infected with murine leprosy both naturally and by inoculation, and found only slight

variations from the normal limits, although the figures were somewhat lower in infected than in healthy animals. Thus the average in normal rats was 0.65 against 0.57 in infected ones but the difference is of very little practical value as the diminution is far too inconstant to be of any diagnostic importance and shows no definite relationship to the severity of the infection present. The figures in some diseased rats may be as high as in healthy ones.

L R

MALDONADO (L. Garcia) La reacción de Kahn en la lepra. [The Kahn Reaction in Leprosy]—*Gac Mld de Caracas* 1935 Dec. 31 Vol. 42 No 24 pp 380-381 1936 Jan 15 & 31 Vol. 43 Nos. 1 & 2 pp 9-16 27-28.

Three significant cases are recorded (1) A man of 20 years with tritis of the right eye. There was no history of syphilis but a Kahn test gave 4 plus. Intensive antisyphilitic treatment had no effect on the reaction and further examination revealed distinct evidence of a mixed form of leprosy—thickened ulnar nerves zones of anaesthesia falling off of the eyebrows bacilli in nasal mucus. (2) A woman of 20 years with papular lesions of the face. Kahn 4 plus no improvement following two courses of antisyphilitic treatment. Leprosy bacilli found in large numbers in the papules. Intensive treatment with chaulmoogra brought about improvement in the clinical condition but did not affect the Kahn reaction. (3) A woman of 25 years with epistaxis and various nasal troubles. She was treated for syphilis and the Kahn 4 plus was held to confirm the diagnosis. Two courses of arsenicals neither benefited the local condition nor changed the Kahn reaction. The author suspecting leprosy examined some infiltrations which had appeared and found the bacillus. Chaulmoogra resulted in marked improvement but the Kahn was still 3 plus.

He proceeded to examine many lepers in Providence Island as regards their Kahn reaction and came to the conclusion that there at any rate the reaction was frequently positive even where syphilis and yaws could be excluded, and he sums up the question in rather obvious terms [reminiscent of the judge in Bardell v Pickwick]. If in a leper the positive Kahn becomes negative under antisyphilitic treatment and at the same time the lesions improve the reaction is to be regarded as due to the syphilitic element if the lesions remain unchanged but the reaction becomes negative under anti-syphilitic treatment both diseases are present if the Kahn becomes negative under treatment for leprosy we ought to regard the reaction as having been due to the leprosy and not in any way the result of syphilis or yaws. Intermediate reactions are analogously interpreted quantitatively whether reduced or not as the result of treatment.

H H S

LAI (Daniel G) & CHEN (Wen Ying) The Wassermann and the Kahn Reactions in Leprosy—*Chinese Med Jl* 1936 May Vol. 50 No 5 pp 702-704

The authors record 12 per cent. positive Kolmer Wassermann and 21.5 per cent. Kahn positives in 167 ambulatory leprosy cases but 40 per cent. positive Kahn tests in 78 Hangchow leprosarium patients. The complexity of the factors prevents them reaching any definite conclusion, so further work is required.

L R

LEFROU (G.) La valeur de la réaction de Verne péréthyadol dans l'épreuve. [Verne's Perythynol Reaction in Leprosy].—Bull. Soc. Path. Exot. 1936. May 13 Vol. 29 No. 5 pp 461-468.

The author records 183 observations on this test in lepers in Gabon. He came to the conclusion that the flocculation of the serum by the perythynol is completely independent of the leprosy factor, in spite of the fact that protein want of balance may exist in both leprosy and syphilis. This does not make the test useless for it is important in treatment to know if leprosy is complicated by syphilis. L.R.

PEREIRA (Paulo C. R.) La réaction de fixation du complément avec l'antigène de Witebsky Klingerstein et Kahn dans la lèpre. [Witebsky Klingerstein and Kahn Tests in Leprosy].—Intern. J. Leprosy Manila. 1936. Apr-June. Vol. 4 No. 2 pp 207-214.

The author reports reaction in the blood sera of 107 cases of leprosy. The reaction is a form of complement fixation first applied by its discoverers to tuberculosis, and later found by Brunn in leprosy and Aoki and Murao in Japan to be present in a very large proportion of leprosy cases. The antigen is an extract of the tubercle bacilli, the details of the preparation of which this paper may be consulted. The test proved positive in 100 per cent. of 12 of the cutaneous type, and in 35 mixed cases as well as in 80 per cent. of 60 neural cases, although it was less strong in the latter. Among 84 sera of persons in continued contact with lepers, mostly children or mates of them, 31 gave negative 4 doubtful and 27 positive reactions. Of the 27 positive all but 9 were probably leprotic or tuberculous, and the last ought to be watched. This test, therefore, gives the highest number of positive reactions in all forms of leprosy of any so it should be employed in cases of difficult diagnosis and in latent leprosy. L.R.

DUBOIS (A.) La réaction de Mitoda. (Notice complémentaire) [Mitoda's Reaction].—Bull. Soc. Path. Exot. 1936. Jun 11 Vol. 29 No. 6 pp 649-651.

The author has obtained very similar results from this test to those of others. Heated and phenolized emulsions of leprosy are injected in 0.5 cc. doses and a papular reaction sought for after 8 to 30 days. The reaction is strongest in normal subjects and in leprosy cases with few bacilli, but negative in those showing many bacilli. The author injected 29 patients with 0.1 cc. intradermally and examined after 8 and 15 to 20 days. He obtained 5 strong, 10 moderate and 7 little reactions but is able to come to no clear decision. L.R.

VAN BARUSSECHEN (R.) Etude de la réaction déterminée par la lyse de Loewenstein chez le lépreux et chez l'homme sain. [Loewenstein's Leprine Reaction].—Ann. Soc. Belge de Med. Trop. 1936 Mar 31 Vol. 16 No. 1 pp 109-113.

The author has used Loewenstein's leprine in lepers and the healthy by subcutaneous injection. He obtained reactions in 39 per cent. of lepers and in about 62 per cent. of non-lepers. L.R.

FRASER (N D) The Iam Tsui Clinic for Patients suffering from Leprosy — *Chinese Med Jl* 1938 May Vol. 50 No 5 pp 693-701

This is an interesting account of a Chinese leprosy clinic founded by a Christian community and partly financed by the patients. It is an early response to recent Canton legislation authorizing the establishment of out-patient and village clinics for the treatment of leprosy patients. The Swatow district is estimated to have 10 000 lepers and it is hoped that the success of this clinic will lead many more to be opened. At the opening in September 1934 26 patients attended at the end of six months 128 had been registered and 89 are attending fairly regularly in spite of some having to come from far with 50 to 75 per cent. of possible attendances. Neural cases form 50 per cent. and some 29 per cent. are fairly early cases. Alepol and iodized moogrol are used and some nodular cases responded rapidly to intramuscular and intradermal injections. The cost has been 25 cents. per visit. It is too early to speak of results but a promising start appears to have been made.

L. R

TOLENTINO (José G) Certain Factors supposed to influence the Results of the Treatment of Leprosy — *Philippine Jl Sci* 1936 Feb Vol. 59 No 2. pp 163-175

This is a general discussion on the influence certain factors are supposed to have on treatment based on the records of 477 cases treated at the Eversley Child Treatment Station in the Philippines between 1929 and 1933 apparently the more favourable earlier cases after 788 patients had been sent to the Cution Leper Colony or had died or absconded.

1 The effect of certain factors supposed to influence the results of treatment has been studied

2 The severity of skin lesions was found inversely proportional to the percentage of paroled cases

3 The duration of the disease was found to have apparently no relation to the results of treatment.

4 The age on admission was found to have a definite relation to the results of the treatment, in that the first, fourth, fifth and sixth decades gave higher percentages of paroled cases than the other decades. The results if plotted with age gave a curve that goes down from the first to the third as the lowest point, gradually rising to the fifth decade as the highest point from which it goes down again.

5 The results of the treatment were found to be apparently better among the females than among the males except in the fifth decade probably due to the menopause which disturbs the physiological life of the females.

6 Contrary to what is commonly claimed puberty and childbirth did not seem to be important factors in the treatment among these cases

7 The results of treatment were found to be good among the widowed patients, but this is due to the fact that they are generally of mature age and in the groups studied there were more females and more of the less advanced cases than among the unmarried and married cases.

8 The degree of nutrition was found to have a definite relation to the results of treatment. The results are inversely proportional to the degree of obesity of the patients. It appears that excess fat in the body has an unfavorable effect on the treatment of leprosy

L. R

VAN BREUSEGHEM (R.) Essai du 4828 A dans le traitement de la lèpre. [Trial of 4828 A in Leprosy]—Ann. Soc. Belge de Med. Trop. 1938 Mar. 31 Vol. 18 No. 1 pp. 115-119

The author reports on eight cases of leprosy treated by an oral chaulmoogra of undisclosed composition called 4828 A. It was well tolerated, but without any special activity in the cases dealt with.

L.R.

DELAKOZ (E.) A propos du traitement mixte de la lèpre. [Mixed Treatment of Leprosy]—Bull. Soc. Path. Exot. 1938 June 11 Vol. 29 No. 6 pp. 641-648.

The author records his experience in treating 150 cases of leprosy in comparatively short periods under favourable hospital conditions. As a result he advises mixed treatment with various combinations of chaulmoogra derivatives, arsenical preparations such as Novarsen-benzol and acetylarsan, B.C.G. Vaccine, solganal B, methylene blue, crisalbline, etc.

L.R.

RYRIE (Gordon A.) The Therapeutic Effects of Phthalic Acid Salts—Internal Jl. Leprosy 1938 Apr-June Vol. 4 No. 2 pp. 201-206.

A new water soluble salt of phthalic acid, called cotamine, has been tried in 20 cc. doses of a 1 per cent. solution twice a week in 19 cases with marked improvement during the first three months only in 9 cases, accompanied by a drop in the sedimentation rate. Three other phthalic acid salts produced no benefit.

L.R.

MONTEL (R.) Conférence sur le traitement de la lèpre par le bleu de méthylène. [Conference on Methylene Blue Treatment]—Ann. Soc. Path. Exot. 1938 Apr 1 Vol. 29 No. 4 pp. 561-571

— BARTLET (J.) NGUYEN Ngoc Nguen & Do VAN Hauz. Deux cas de lèpre traités par le bleu de méthylène seul, d'abord, et par l'association Bleu de méthylène-chaulmoogra, en sick Action du traitement sur les symptômes cliniques, sur les tissus et sur le *Mycobacterium leprae*. [Two Cases treated with Methylene Blue.]—Ibid. May 13 Vol. 29 No. 5 pp. 580-578 With 10 figs.

The first of these papers records the following results of the treatment of 351 leprosy cases by combined chaulmoogra derivatives and methylene blue.

	Per cent.
Clinically cleared up	10.25
Notably ameliorated	31.75
Ameliorated	45.67
Stationary	6.53
Aggravated	1.43
Died	1.14

The second paper records in detail, with good photos, remarkable improvement in two fairly advanced nodular cases of leprosy together with microphotos illustrating the tissue reactions.

L.R.

Fixon Une indication du bleu de méthylène dans le traitement de la Lépre.—*Bull Soc Path Exot.* 1938 June 10 Vol. 29 No 6 pp 646-647

GRAMBERG (K. P. C. A.) Eenige beschouwingen over de praktijk der leprabehandeling en bestrijding in N.O.L.—*Genootsch Tijdschr v Nederl Indië* 1938. July 7 Vol. 78 No 27 pp 1700-1721
English summary

WATANABE (Yoshimasa) Experimental Studies on Animals concerning Leprosy Report VI. Inoculation Tests with Rat Leprosy (Part 2)—*Kitasato Arch Experim Med* 1938 Apr Vol. 13 No 2 pp 158-168.

The author records attempts to infect guineapigs rabbits and monkeys by inoculating them subcutaneously and intratesticularly with emulsions of rat leprosy nodules. In the case of guineapigs the results were negative although the acid fast organisms may remain alive in their bodies for some time. In rabbits in some instances very mild slightly developed lepromous changes were found at the site of inoculation with retention of the vitality of the bacilli for a time but it can be said in a general way that normal rabbits are not susceptible to leprosy. In Japanese monkeys none of the animals showed clear evidence of complete infection although large doses of rat leprosy material may produce temporary lepromous changes containing numerous acid fast organisms, but the lesions heal readily and spontaneously without leaving any signs of leprosy.

L. R.

LAMPE (P. H. J.) & DE MOOR (C. E.) Ratten-Lepra [Rat Leprosy]—*Genootsch Tijdschr v Nederl Indië* 1938 June 30 Vol. 76 No 26 pp 1619-1641 With 3 graphs. English summary

The authors have made an extensive study of the incidence of rat leprosy in Batavia. Clinically they differentiate between lymphoid and skin leprosy and found 930 of the former and 225 of the latter per 10 000 rats. The natural infection is a lesion of the subcutaneous lymph glands of the groin jaw and mesenteric regions, and the bacilli are also regularly found in the skin at the root of the tail. The house rats are most affected. *R. concolor* and *R. norvegicus* suffer more than *R. r. diadu*. Infection probably occurs chiefly through skin injuries and cannibalism may account for the one-third of the cases in which the jaw and mesenteric lymph nodes are involved.

L. R.

PRUDHOMME (R. O.) Le glutathion total dans la lépre murine. [Glutathion in Rat Leprosy]—*C. R. Soc Biol* 1938 Vol. 122 No 22 pp 739-741

The author had previously found a notable diminution of glutathion in severely infected lepromous rats but normal figures in those slightly attacked. He now reports on the relationship between oxidized and reduced glutathion in infected rats and concludes that although the reduced substance falls in badly involved organs the pre-existent glutathion is not oxidized but disappears.

L. R.

LOEKI (L. W. M.) Buffellepra (*Lepros bubalorum*) [Buffalo Leprosy]—Reprinted from *Handelingen v/a Td's Natl. Ind. Natuurwetenschappelijk*, p. 385

In buffaloes of the Netherlands Indies (*Bos bubalis var. indicus*) skin disease occurs which has not been noticed elsewhere. So far 80 cases have been discovered distributed as follows. In Java—Semarang 9, Cirebon 7, Serang 5, Batavia 2. In Celebes—Manado 2, Watampone (Makale) 2, Makassar 1.

In Resort Paloe (Manado) leprosy of buffaloes is comparatively common. Search is being made in this district for cases in an early stage and to discover if possible whether there are any latent ones. At the Seventh Scientific Congress, clinical bacteroscopic and histological pictures of *lepros bubalorum* were shown on the screen.

H.B.S.

HELMINTIASIS.

LEIPER (R. T.) Crustacea as Helminth Intermediaries.—Proc Roy Soc Med 1936 July Vol. 29 No 9 pp 1073-1074 (Sect Trop Dis. & Parasit. pp 43-44)

A demonstration by microscope and lantern of crustacea as helminth intermediaries.

There is need for regional surveys in the tropics of species of crustacea specially of the Entomostraca and of the genus *Cyclops*. That *Cucullanus* underwent development in *Cyclops* led LEUCKART to suggest to FEDSCHENKO that *Dracunculus* did so. Of this FEDSCHENKO thought he had got proof but LEIPER contrasting the metamorphosed larva of *Dracunculus* which he had himself got in *Cyclops* with that of *Cucullanus* showed the likeness of Fedschenko's larvae to those of *Cucullanus*. Preparations showed the development of *Gnathostoma spinigerum* in English cyclops. *Cyclops* also harboured parasites of fish and turtle. None of man's trematodes has been shown to develop in *Cyclops* but the pseudophyllidae need a *Cyclops* species as their first intermediary. No cyclophyllid tapeworm of man makes use of *Cyclops*.

Development of trematodes of man in crustacea is undergone only by *Paragonimus westermani* in Malacostraca. The list of species concerned is—

"*Atelurus (Cambaroides) japonicus* A (C) *similis* A (C) *dahuricus* A (C) sp *Potamon (Geothelphusa) dehaani* P (G) *obtusipes* P (*Parathelphusa*) *sinensis* *Pseudothelphusa ilurbei* *Eriocheir sinensis* E *japonicus* *Sesarma dehaani* (experimental not a food crab)

In discussion Arthur BLOM asked whether any European fresh-water mollusca acted as hosts of *P. westermani*; if so the mitten crab the second intermediary might have a sinister effect on health in Europe. In replying Professor LEIPER pointed out that mollusca were much more specific as first intermediaries than crustacea as second intermediaries and that none of the first intermediaries had been reported in Europe. He thought that the prohibition of infected Axantes into the United States had a political rather than a parasitological significance.

Clayton Lane

PETRIE (B. G.) Some Recent Developments in Helminthology.—Proc Roy Soc. Med. 1936. July Vol. 29 No 9 pp 1074-1084 (Sect. Trop Dis. & Parasit. pp 44-54) [64 refs.]

A picture of parasitism as exemplified by cestodes under the heads of life-history anomalies resistance to digestion, metabolism, immunity and immunological reactions.

The author concludes—

"They repeatedly follow the complicated routine of their life-cycle yet depart from it occasionally in an attempted adjustment to abnormal circumstances. They display ingenious processes physical and chemical, for resisting the digestive fermentations of the host and to gain access from the outside world to the host's tissues or intestinal lumen. Once there they adapt themselves to changed conditions (plentiful food but little oxygen) by assuming an anaerobic mode of life. Then the host intervenes at least in some somatic infections by elaborating antibodies which protect it from super-infection. So that in the end something like equilibrium between the two is achieved. These antibodies cautiously used give the clinician a number of valuable diagnostic techniques."

The picture is of course, far from complete even with respect to existing knowledge (it omits particularly the many tissue reactions of the host) and there are extensive areas which cannot yet be filled in. But it is more detailed than would have been possible ten years ago. With further researches into the physiology and immunology of helminthic infections, it is likely that their diagnosis, treatment, and prevention will become increasingly precise and effective.

C. L.

- i. KOMIYA (Yoshitaka), KAWADA (Hiroaki) & TAO (C. S.). On the Prevalence of Helminthiasis among the Japanese and Chinese in the District of Shanghai. I. Results of Examinations of Helminth Ova among the Chinese Children and Students.—Reprinted from *Jl. Shanghai Sci. Inst.* 1936, Mar. Sect. IV Vol. 2 pp. 85-94.
- ii. —— & —— II. Results of Examinations of Helminth Ova among the Japanese and Chinese Servants and Cooks in Restaurants and Cafés.—Reprinted from *Ibid.* Apr. Sect. IV Vol. 2, pp. 95-107. [32 refs.]
- iii. —— & —— III. Results of Examinations of Helminth Ova among the Japanese Primary School Children.—Reprinted from *Ibid.* May Sect. IV Vol. 2, pp. 117-139. [21 refs.]
- iv. —— & —— IV. Results of Examinations of Helminth Ova among the Japanese Students of the Girls High School, Commercial School and Tung Wan College.—Reprinted from *Ibid.* pp. 139-151. [16 refs.]
- v. TAIJIKI (Tai). V. Results of Examinations for Helminths among Japanese Kindergarten Children and their Faculty Members. Reprinted from *Ibid.* June, Sect. IV Vol. 2, pp. 169-181. With 1 plate. [17 refs.]

Helminthiasis in Shanghai as disclosed after examination by a hydrochloric acid, antiformin ether method. The scope of the different papers is seen in their subtitles.

i. The numbers tested were—in primary schools 83, middle school 168, Medical College 312. The percentages of infection in the three groups were—ascaris 20.55.49, trichuris 11.37.37, hookworms 4.5.6, trichostrongylus 0.1.1, clonorchis 2.2.5, fasciolopsis 0.2.1. The figures in papers by other workers in different parts of China are cited and infections with 2 or more sorts of worms are listed.

ii. The numbers tested were—Japanese 109, Chinese 181. The numbers of the two races in whom infection was seen were—ascaris 25.8, trichuris 57.94, hookworms 23.44, threadworms 1.1, trichostrongylus 1.1, clonorchis 23.19, fasciolopsis 0.2, metagonimus, 2.8. The distribution is put out in tables by age and sex. As many as 5 infections were present in the same person.

iii. The numbers tested were 2,523. The percentages of infections were—trichuris 37, ascaris 15, hookworms 5, clonorchis 3. There were seen a few infections with enterobius, trichostrongylus, metagonimus and hymenolepis. In about a quarter there was more than one infection. No marked difference in growth was seen in those with or without parasites.

iv. In the faeces of 303 girls the numbers in which eggs were found were—ascaris 71, trichuris 113, hookworms 27, trichostrongylus 1, clonorchis 23, Hymenolepis nana 1, total infected 168.

v. The numbers are few but the belief is that infection is likely to be familial, with the mother mainly responsible for dissemination.

C. L.

ROBERTSON (R. C.) The Transmission in China of Helminths by Vegetables.—*Chinese Med Jl* 1936 Feb. Supp No 1 pp 418-422. With 10 figs on 5 plates

The possibility of contamination of raw vegetables by worm eggs about Shanghai is great.

Vegetables are fertilized by human or animal faeces and they are often washed in a neighbouring creek or pond where the night soil commodes have been rinsed out in the morning or where the water has been contaminated by sewage in a number of other ways. The deadly effects of heating ascaris eggs are illustrated by microphotographs but Robertson thinks that the suggestion of heating the fertilizer at the central depot is Utopian. [By natural decomposition the Beccan process sterilizes by heat even in small quantities and produces a most valuable humus.]

C L.

TAO (C S) Transmission of Helminths Ova by Flies.—Reprinted from *Jl Shanghai Sci Inst* 1936 Apr Sect. IV Vol. 2. pp 109-116

Carcass of worm eggs by flies may take place on their legs or in their intestines.

In 64 fly traps which were emptied in all 189 times 146,563 flies were caught 71 per cent. being *Musca* 13 per cent. *Lucilia* and 16 per cent. *Compsomyia*. Worm eggs were found in the liquid of the traps in 8 of the 64 places in which they were set—33 eggs in all, and in detail 24 ascaris 6 trichuris and 8 hookworm. Of 206 flies caught near latrines and dissected, 58 per cent. had these 3 sorts of eggs in their intestines and none on their legs but flies fed on parasitic ova do have them on their legs generally about the pulvilli. Yet it is thought that the weight of these eggs will make a fly less airworthy so that it cleans these off quickly and so carries them for only a short distance in this way but takes eggs further afield in its intestine. But on the other hand, flies pass faeces very soon after taking food and so probably pass worm-eggs also]

C L.

CHEN (H. T.) Parasites in Slaughter Houses in Canton. Part I. Helminths of Kwangtung Hogs.—*Lingnan Sci Jl* (continuation of *Lingnam Agric. Rec.*) 1936 Vol. 15 No 1 pp 31-44 With 17 figs. [16 refs.]

Helminths seen in 100 slaughtered hogs in Canton which have the greatest importance for medicine are in order of frequency—*Ascaris lumbricoides* 40 *Fasciolopsis buski* 26 *Clonorchis sinensis* 1 (in stomach) *Fasciola hepatica* 1 A few *Ancylostoma caninum* were found once in the stomach and a single sparganum in the intestine taken in with food.

C L.

RYO (Sai) A Survey of the Distribution of Helminthic and Protozoan Parasites among 10293 Inhabitants of Fushun.—*Jl Oriental Med* 1936 June Vol. 24 No 6 [In Japanese pp 1145-1152. English summary p 81]

Parasitic infestation is heavy among the population of Fushun. The subjects examined included all classes—general civil population (100)

The picture is, of course, far from complete even with respect to existing knowledge (it omits particularly the many tissue reactions of the host) and there are extensive areas which cannot yet be filled in. But it is more detailed than would have been possible ten years ago. With further researches into the physiology and immunology of helminthic infections, it is likely that their diagnosis, treatment, and prevention will become increasingly precise and effective." C. L.

- I. KOMIYA (Yoshitaka) KAWANA (Hiroaki) & TAO (C. S.) On the Prevalence of Helminthiasis among the Japanese and Chinese in the District of Shanghai. I. Results of Examinations of Helminth Ova among the Chinese Children and Students.—Reprinted from *Jl. Shanghai Soc. Inst.* 1938, Mar. Sect. IV Vol. 2 pp. 85-94.
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Helminthiasis in Shanghai as disclosed after examination by 1 hydrochloric acid, antiformin ether method. The scope of the different papers is seen in their subtitles.

The numbers tested were—in primary schools 55 middle school 189 Medical College 312. The percentages of infection in the three groups were—ascaris 20 55 48 trichuris 11 37 37 hookworms 5 6 trichostrongylus 0 1 1 clonorchis 2 2, 5 fasciolopsis 0 2, 1. The figures in papers by other workers in different parts of China are noted and infections with 2 or more sorts of worms are listed.

ii. The numbers tested were—Japanese 109 Chinese 151. The numbers of the two races in whom infection was seen were—ascaris 51, 6 trichuris 57 84 hookworms 23 44 threadworms 1 1 trichostrongylus 1 1 clonorchis 29 13 fasciolopsis 0 2, metagonimus, 2, 0. The distribution is put out in tables by age and sex. As many as 5 infections were present in the same person.

iii. The numbers tested were 2,523. The percentages of infection were—trichuris 37 ascaris 15 hookworms 5 clonorchis 3. There were seen a few infections with enterobius, trichostrongylus, metagonimus and hymenolepis. In about a quarter there was more than one infection. No marked difference in growth was seen in those with or without parasites.

iv. In the faeces of 303 girls the numbers in which eggs were found were—ascaris 71 trichuris 113 hookworms 27 trichostrongylus 3 clonorchis 23 Hymenolepis nana 1 total infected 166.

v. The numbers are few but the belief is that infection is likely to be familial with the mother mainly responsible for dissemination. C. L.

SATTA (Ernesto) Identificazione del primo focolaio di Bilharziosi intestinale da Sch. mansoni nella Colonia Eritrea. [A Focus of *S. mansoni* Infestation in Eritrea.]—Arch Ital Sci Med Colon e Parassit. 1936 Apr Vol. 17 No 4 pp 193-205 With 5 figs. & 1 map [22 refs.]

A case of Mansonian schistosomiasis infected in Eritrea.

An Italian, after a year in Eritrea had a bath in a pool of the fast mountain stream, Dadda, got pruritus all over the body 10 hours later and in 30 days fever and dysentery. There were eggs of *S. mansoni* in the faeces. In that stream *Planorbis boissyi asmarica* n. var was present. Satta makes the statement that in his review of the literature of January 1936 [this Bulletin 1936 Vol. 33 pp 1-15] LANE says that *S. mansoni* does not exist in Eritrea Ethiopia or French or English Somaliland [the words used were that from these places No accounts have come to light a very different thing] and makes the point that GIROLAMI had collected cases in the Italian literature from Eritrea [see this Bulletin 1936 Vol. 33 p 553] [The writer's intention to make clear the gaps which there are in the records has then had a quick and fruitful result.]

C. L.

FARGES. Sur quelques foyers de bilharzioses en Côte d'Ivoire. [Foci of Schistosomiasis on the Ivory Coast.]—Ann de Med et de Pharm Colon 1936. Apr-May-June. Vol. 34 No 2 pp 334-337

The subject of the title of this paper is mainly of local importance only. The author finds however that anthromaline is of equal value to tartar emetic, blood ceasing to be present in the urine after 0.2 gm. it is remarkably well tolerated, and is easily given subcutaneously or intramuscularly a point of importance in treating children and where injections are given by the unskilled.

C. L.

KHALIL (M.) & AZIZ (M. Abdel) An Epidemic-like Increase of Mortality due to Intestinal Schistosomiasis in an Egyptian Village.—Jl Egyptian Med Assoc 1936 Aug Vol. 19 No 8 pp 475-495 With 8 graphs 3 maps & 2 figs.

In the village of Tanaa 25 km. to the north east of Cairo and with about 9 000 inhabitants there took place in the autumn of 1934 and again of 1935 an unexplained rise in the death rate in men only. The symptoms were those of dysentery debility anaemia with haemoglobin down to 20 or 30 and eosinophilia. Malaria parasites were absent, microfilariae were present in 8 per cent. and enlarged spleen and liver in 5 per cent. When death took place it did so in 2 to about 24 months. In one girl who died there were many worms in subperitoneal nodules such as are seen only in heavily infected animals. There were some worms in abdominal lymph glands and living eggs in liver and pancreas. From examination of urine and faeces of 396 inhabitants 55 per cent. showed eggs of *S. haematobium* (in males 88 per cent. in females 24 per cent.) while 59 per cent. showed those of *S. mansoni* (in males 59 per cent. in females 31 per cent.) The canal running through the village was piled with refuse and dead dogs. The mosque sewer opens into it and the mosque latrines are used very freely by those living near. *Physa acuta* and *Planorbis boissyi* are many and large in this canal. A scheme is on foot for a new irrigation canal to take the place of this (1936)

soul one and for the permanent closure of the mosque hunes. [The "Contents" of the journal are in error in attributing this paper to Khalil alone.] C.L.

TRIM (E. A.) Schistosomal Cirrhosis and Splenomegaly in the Central Raylondo District of Kenya Colony.—*East African Med. J.* 1951 Aug. Vol. 13. No. 5 pp 130-141 With 3 figs. on 1 plate [30 refs.]

Cirrhosis of liver generally with splenomegaly is present in more than 1 per cent. of inpatients in the native hospital, Kisumu all of them lived where *S. mansoni* is prevalent and in half of them the eggs of the parasite were seen. The changes in blood, spleen and liver were like those of schistosomiasis, in fact they are cases of "Egyptian splenomegaly" C.L.

RODRIGUEZ MOLINA (R.) Schistosomiasis mansoni. Cirrhosis of the Liver with Splenomegaly and Macrocytic Anemia.—*Bol. Asoc. Med. Puerto Rico* 1939 June. Vol. 23. No. 6 pp. 119-122

RODRIGUEZ MOLINA (R.) Anemia in Schistosomiasis Mansoni and its Treatment in Puerto Rico.—*Bol. Asoc. Med. de Puerto Rico* 1951 July Vol. 23. No. 7 pp. 148-151

A study of the blood in 20 cases of Manzanian schistosomiasis. The blood was taken from a vein 3 cc. being kept liquid by the addition of 6 mgm. of dry potassium oxalate and 100 per cent. Hb. being taken as that present when there were 14.5 gm. in 100 cc. of blood. One case was seen in the first or toxicemic stage with red cells 5,400,000, Hb. 83 mean corpuscular Hb. 22 micro-micrograms (slightly below normal) mean corpuscular volume normal. In the second diarrhetic stage 6 were seen red cells 3,400,000 to 4,900,000 Hb. 55 to 61, the blood hypochromic microcytic in 5 normocytic in 3, the anemia responded to iron and ammonium chloride 2 to 8 gm. daily but neither folic acid nor liver extract had any influence. In the third diarrhetic stage 11 were seen in 6 the anemia was macrocytic, in 3 microcytic, in 2 normocytic, the red cells were from 1,360,000 to 3,960,000, Hb. 35-100. In the 5 macrocytic cases there had been haemorrhage from the bowel and in one haematemesis, and it is a microcytic anemia which goes with loss of blood, and this microcytic anemia "seems to fit" with the clinical picture of cirrhosis of the liver, splenomegaly and anaemia encountered in Banti's syndrome. Can the macrocytic anaemia in the late stages of schistosomiasis be considered as an indication of liver dysfunction? In two cases splenectomy has been followed by marked clinical improvement. C.L.

ERRATUM.—Vol. 33. No. 7 RODRIGUEZ MOLINA & POST 1951 pp. 555-558 15th line from top of p. 558 for "by the specific antianemic factor" read "of the specific antianemic factor"

GIOANNOLA (Arnaldo) Specific Action of Some Drugs on Experimental Infections of Schistosomes mansoni.—*Actas J. E.S.* 1956 July Vol. 24 No. 1 pp. 102-108.

Tartar emetic proved the best drug for the killing of schistosomes' experimental conditions.

The test animals were rabbits in 3 series the last two having controls showing that 43 and 147 worms became parasites. They were infected either by dropping the same quantity of the same cercarial suspension on to the shaved abdomen or by being put with shaved abdomen in the same infective bath. They were then given a curative drug. After tartar emetic given intravenously in a 6 per cent. solution to a total of 75 mgm. in doses of 15 mgm. every other day no living flukes were present after acriflavine (2 per cent. in water freshly made and put into the stomach by tube in quantities of 40 mgm. on alternate days to a total of 200 mgm.) there were present about 100 38 and 73 after emetine hydrochloride injected intramuscularly in 4 per cent. solution on alternate days in doses of 10 mgm. (total 30 mgm.) or 5 mgm. (total 25 mgm.) the living worms numbered 12 not done and 6 after fouadin injected intramuscularly in 2 injections of 0.25 cc. and 7 of 0.5 cc. there were in the first series about 200 and in the second 40 worms after acriflavine by mouth (40 mgm. every other day and 200 mgm. in all) the surviving worms were about 100 38 and 73 Fouadin did not show a specific action Acriflavine was without use. Emetin hydrochloride had some action especially when given in smaller doses. None of the drugs prevented infection when given previous to it.

C L

Cawson (F Gordon) The Duration of Treatment for Bilharziasis.—
Jl Trop Med & Hyg 1936 Sept 15 Vol. 39 No. 18.
 pp 212-213

The comparatively large doses of tartar emetic given to children without ill effects should be got into a period of a month. *S mansoni* infections need special care and attention. A patient given 40 cc. of anthromaline has put on 7 lb in 6 months and remains free from signs of infection. Boys of 8 and 10 have needed 30 cc. of the drug in a month to bring about cessation of passage of eggs. But in one such child a rise in eosinophils from 8 to 29 per cent after treatment suggests care in pronouncing cure till these cells become normal in numbers.

C L

GIOVANNOLA (Arnaldo) Unisexual Infection with *Schistosoma mansoni*—
Jl. Parasitology 1936 June Vol. 22 No. 3 pp. 289-290
 With 1 fig

GIOVANNOLA (Arnaldo) Comparative Action of Tartar Emetic and Fouadin on *Schistosoma mansoni* in vitro—*Jl. Parasitology* 1936 June. Vol. 22 No. 3 pp. 302-303

BINDRA (B. S.) The Treatment of Schistosomiasis Extract from Thesis on *Schistosoma japonicum*, and the Problem of Schistosomiasis in India.—*Jl Trop Med & Hyg* 1936 Aug 1 & 15 Vol. 39 Nos. 15 & 16 pp 175-179 185-190 [83 refs.]

KAN (Hua-Chieh) & KUNG (Jen-Chi) Incidence of Schistosomiasis Japonica in an Endemic Area in Chekiang—*Chinese Med Jl* 1936 Feb. Supp No 1 pp 449-458 With 3 figs & 1 sketch map.

SPARROW (J. T.) Schistosomiasis Japonica an Account of an Outbreak.—*Jl Trop Med & Hyg* 1936 July 15 Vol. 39 No. 14 pp. 161-164 [15 refs.]

CAWTON (F Gordon) Destruction of the Bilharzia Parasite of Man.—*Jl Trop Med. & Hyg.* 1936, July 1 Vol. 39 No. 11 pp. 138-152.

WATT (John Yin Chieh) Study on the Bionomics of the Intermediate Host of *Schistosoma japonicum* in Kiating Chekiang 1934-5.—*Chinese Med. Jl.* 1936 Feb. Supp. No. 1 pp. 434-441. Fig. 1 map & 1 chart.

The bionomics of *Oncoceraspis* snails were studied for a full year. Their habitats varied with season, hibernation in earth taking place in winter. The highest percentage infection rates of 16,501 snails were in March (3.18) and September (3.4), the mean for all months being 1.28. Breeding takes place about May and September. C.L.

EDGAR (W. H.) Report on a Case of Epilepsy due to Infestation by *Schistosoma japonicum*.—*Jl Roy Soc Med. Scir.* 1932 Apr. Vol. 22 No. 2 pp. 150-153.

Epileptiform convulsions, preceded by closing in of the right side of the field of vision, some wavering of sight, and an occasional twinge for the right word, a paracentral scotoma in the right inferior temporal quadrant and some aching on the left parietal bone led to operations which displayed under this bone a sharply outlined spherical yellowish tumour an inch in diameter which was pronounced "to consist of the ova of *S. japonicum*". A month later the condition was not improved. C.L.

KAN (Hua-Chieh) Intracutaneous Test with *Schistosoma japonicum* Antigen. (A Preliminary Report).—*Chinese Med. Jl.* 1936 Feb. Supp. No. 1 pp. 387-393.

Preparation of Antigen.—The antigens which were used were prepared as follows. Adult *Schistosoma japonicum* were obtained from experimentally infected rabbits. *Taenia crassicerca* or *Globochis elongata*, which were used as the control antigen, were obtained from infected snails. The helminths were washed with saline and dried in a desiccator. Thirty helminths were then powdered and for one week extracted in a shaking machine with 1/10 normal sodium carbonate solution containing 1 per cent phenol, using 100 parts of phenolized sodium carbonate solution to 1 part of the dry powder. The suspensions were separated by being centrifuged at a speed of 3,000 r.p.m. for 30 min. One part of the supernatant fluid was then diluted with 51 parts of normal saline, thus giving a concentration of 1 part of dried powder in 3,200 parts of diluents. This has been found to be satisfactory.

The phenolized saline for control was prepared by adding 1 cc. of phenol to 100 cc. of normal saline.

The following is the author's summary of tests made with this antigen.—

- (1) Intracutaneous injections of *Schistosoma japonicum* antigen given to 824 persons, using *Taenia* or *Globochis* antigen and phenol saline as the controls.
- (2) Of the 101 females tested, 26 were positive to the test.
- " (3) Of the 523 males tested, 397 were positive to the test.
- " (4) Of the 423 persons in the positive group, 39.4 per cent resided in the endemic regions.

- "(5) In 48·6 per cent. of the cases in the positive group the result of this test agreed with the findings of the physical examination.
 (6) In 60·4 per cent. of the cases in the positive group results of this test agreed with those of the faecal examinations. C. L.

- i. KRAIN (M.) Individual Variation in the Excretion of Drugs as an Important Factor in their Therapeutic Results. A Practical Method for detecting the Schistosomiasis Cases with So-called Idiosyncrasy to Antimony to avoid Fatalities and Complications.—*Jl Egyptian Med Assoc* 1936. June. Vol. 19 No 6. pp 285-305 (No 8. pp 502-510 Discussion.)
- ii. —— Excretion of Drugs Its Influence on Therapeutic Results with Special Reference to the Antimony Treatment of Schistosomiasis.—*Lancet* 1936 July 18. p 132.

i. Persons vary much in their rate of excretion of antimony (and arsenic). Those whose excretion is quick are resistant to treatment with the drug and have to be given a series of courses. Those whose excretion is slow are liable to poisoning whose end may be death. Those with a mean rate are cured normally.

Of 1,938 cases of schistosomiasis treated with founadin 53 per cent. were cured after 9 injections 21 after 11 6·6 after 13 3·4 after more than 13 and 16 gave up treatment. About 1 per cent. were intolerant of the drug and 0·2 per cent. died suddenly. Most of these cases are never reported in Egypt. Relapses took place in 33 per cent. of cases. The hypothesis is put forward that the facts known can be all explained on the basis that individuals vary in their power of excretion of antimony from their bodies. Founadin is a solution of a compound of antimony and pyrocatechin. The test used is for pyrocatechin in the urine and is this. To 5 cc. of clear urine add 5 cc. of a fresh 0·05 per cent. FeCl_3 solution. After shaking add 1 cc. of a strong ammonia solution and shake. The colour at first green changes to violet and then red with the strong alkali. The reaction can be brought about with ferrous salts and so is not due to catechol. The colour begins to be seen in some persons 15 minutes after an intramuscular injection of founadin in others there is none even after 24 hours in the normal case it is seen after 3 hours. The delay in excretion corresponds to the kidney efficiency as tested by the urea concentration test and blood urea. Cases that excrete founadin quickly need more injections to get cured. The intensity of the reaction corresponds roughly to the amount of antimony excreted judging by the stain on the copper foil of the Rensch's test. As to treatment The correct way is to calculate the dose according to the amount retained in the body for a reasonable time. This can only be done by quantitative estimation of the amount excreted within a few hours and this is the aim we are at present trying to attain.

As to the Egyptian problem at an estimate there are 10 million cases of schistosomiasis about one million take treatment every year 2,000 of them are killed by antimony. This founadin tolerance test may be used as a kidney efficiency test.

Pages 502-510 contain a discussion by 9 persons on the paper just summarized. GURVINA asked whether there were cases of catechol retention with ordinary urinary findings. Khalil in answer said that there were such cases with apparently normal kidneys "this agrees however with the result of the urea concentration tests when done on

YAWS AND SYPHILIS.

SAUNDERS (George M.) KUHN (Henry W.) & REED (James I.).
The Relationship of Certain Environmental Factors to the Distribution of Yaws in Jamaica.—Amer. Jl. Hyg. 1938, May Vol. 23 No. 3. pp. 558-579 With 6 maps. [14 refs.]

In this article are detailed the results of studies and observations (conducted with the support and under the auspices of the International Health Division of the Rockefeller Foundation and the Government of Jamaica) upon the present distribution of yaws in Jamaica as it is related to the environmental factors of rainfall, geology, topography, the presence of Hippelates flies, etc.

Though the disease has the opportunity of spreading to every part of the island as infective cases are constantly being introduced into all areas yaws is localized in Jamaica to certain sharply delimited areas, thus suggesting that certain factors limit the spread of the disease and others favour its propagation. The results to date cannot be better expressed than in the authors own words —

Rainfall seems to have an important influence on the prevalence of yaws although we cannot be certain whether it affects the disease directly causing more infectious lesions to appear or whether it is important indirectly in that it favors a dense vegetation. This in turn might affect distribution by providing suitable breeding places for sand vectors, by increasing the likelihood of injuries to the lower legs and feet where the primary yaws lesion nearly always appears, or by maintaining the viability of the infecting organism outside the body. The underlying geological formation seems to be an important factor, for wherever we find porous white limestone there is little or no yaws. This may be because the ground dries very rapidly in such places and because there is usually a poor surface soil and scant vegetation. On the other hand in most places where there is a relatively impervious formation with productive soil, ample precipitation and a jungle type of flora, yaws is common. Altitude seems to have little direct effect, for we find yaws at all elevations where there is a country peasant type of population. It may however have an indirect influence, because precipitation tends to be greater over hills than over low-lying plains. The sanitary status of the country peasant is essentially the same throughout the island, but in districts where yaws is found, the disease is commonest among the lowest social orders. In fact, it may be said categorically from our experience that yaws almost never occurs among the upper classes and that a low standard of living is essential to the prevalence of the disease. Villages and towns always show less yaws than the surrounding country. This may be due to the presence of a slightly higher social order in the town or to a scantier vegetation. Wherever there is much yaws, *H. pallipes* flies are found in abundance and as a rule the opposite is true, although there are places where the flies are found in great numbers and where the disease is absent. Also, in comparing the incidence of yaws with the fly catch by adjoining urban and rural districts we find that although the disease is much commoner in rural parts, the fly catch is essentially the same as in the urban parts. We cannot yet decide whether the distribution of *H. pallipes* in Jamaica determines the distribution of yaws, or whether both are affected by the same environmental factors, causing their distribution to coincide.

H. S. Jones.

KUMK (Henry W.) The Jamaican Species of *Hippelates* and *Oscinella* (Diptera, Chloropidae).—*Bull. Entom. Res.* 1938 July Vol. 27 Pt. 2 pp 307-329 With 6 figs. & 1 plate. [16 refs.]

The author has focussed attention on these flies because they are the insects which were found in greatest abundance feeding on the ulcers of yaws and are possibly important as vectors. There are fifteen species of Chloropidae in Jamaica, of which *Hippelates pallipes* Loew is the most widely spread and abundant. The distribution of all the species in the island is described in detail and a key with clear explanatory diagrams for identification is given.

V B Wiggleworth

KUMK (Henry W.) The Natural Infection of *Hippelates pallipes* Loew with the Sprochaetes of Yaws.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1935 Nov 25 Vol. 29 No 3 pp 265-272 With 1 chart & 3 figs on 2 plates.

KUMK (Henry W.) & TURNER (Thomas B.) The Transmission of Yaws from Man to Rabbits by an Insect Vector, *Hippelates pallipes* Loew.—*Amer. Jl. Trop. Med.* 1938 May Vol. 16 No 3 pp 245-271 With 5 plates. [17 refs.]

A paper detailing the first successful transmissions of yaws to rabbits by means of Hippelates flies

Treponemata are found in large numbers in the oesophagus of this fly after an infecting meal but they diminish rapidly so that none are found after 48 hours. There is no evidence of invasion of the salivary glands or proboscis nor of cyclical development nor of contamination of the legs. On the other hand it was found that this fly repeatedly regurgitates vomit drops containing treponemata during some hours after feeding. This appears to be the probable mode of transmission from patient to wound on the second subject. In the experimental work flies were allowed to feed alternately on a yaws lesion and then either on a granulating wound on the back of a rabbit or on a freshly scarified area on the scrotum. In other cases the inoculum consisted of the dissected out infected oesophageal diverticula.

It was found that the scrotum site was the more easily infected and it was also discovered that inoculations made in the winter with removal of the animals from Kingston to New York for the incubation period were the more successful. [A very interesting point in experimental work.]

H S S

CHENOI (C F) SIDDIQUI (M Ahsan) & ABRAHAM (A C.) Investigation of Yaws (Aoya Disease) in Warangal.—*Indian Med. Gaz.* 1938 June Vol. 71 No 6 pp 322-326. With 1 map

Yaws has generally been considered to be very rare in India. The discovery of the disease in the Warangal district is therefore of considerable interest. So far in the state of Hyderabad it has been found confined to the jungle tract to the east (between the Mungeru river and the Kodavari). It is believed, however by the authors that yaws may also exist on the other side of the Kodavari in the East Godavari area and in the Chanda forest. [It would seem not improbable that yaws will be found much more widely distributed in India than has been supposed when search is made among other primitive forest tribes.]

Persons of all ages were found to be suffering from the affection, the incidence being estimated at 5 per cent. Gonds and Doms, primitive tribes of Dravidian origin, formed the bulk of the sick. They are spoken of as a semi-starved people wearing only a loin-cloth, who huddle together in their huts for warmth. They are, however, of clean habits in regard to their houses and persons. They believe that infection results from contact but blame the red ant as playing some part. They say that "Mothers suffering from Koya (yaws) never have given birth to a child suffering from the disease."

[From the clinical description given there is little doubt that the disease is framboesia though the descriptive terms used would appear to be sometimes rather loose.]

Sabre-tibia is not an uncommon affection gangoza occurs and mention is made of a case with ulceration of the forehead and necrosis of the frontal bone. No cases exhibiting lesions of the mucosæ mentioned were seen and no mention is made of J.A.N. or guandou. H.S.S.

HACKETT (Cecil J.) A Critical Survey of Some References to Syphilis and Yaws among the Australian Aborigines.—*Med. J. Australia* 1938 May 30 23rd Year Vol. I No. 22 pp. 733-751 [51 refs.]

In this paper the author gives a critical review of all or nearly all that has been written upon the occurrence of syphilis and yaws in the Australian aborigines. It is for this reason impossible to summarize and Dr. Hackett's conclusions only will be given. He suggests that the references made by the older writers to venereal disease probably all refer to yaws and not syphilis, granuloma pododi being excluded. He believes that when Australia was discovered by Europeans yaws was prevalent in all communities and that this disease persists among them so long as they are not divorced from their bush fashion of life. Yaws is endemic in the Northern Territory and in Central Australia areas where syphilis is unknown.

H.S.S.

HACKETT (Cecil J.) Boomerang Legs and Yaws in Australia Aborigines.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1938 July 31 Vol. 30 No. 2 pp. 137-149 With 1 map & 4 figs. on 2 plates [19 refs.]

A very interesting paper dealing with the condition which in Australia has been referred to as boomerang leg its relation to yaws and their distribution in that continent.

The author has shown that among the aborigines of the centre of Australia there is a widespread disease known to them as *whi-wa* which he has identified as yaws. The disease is contracted in infancy or early childhood, lasts a certain time and then clears up. After a quiescent period of some years pains in the shins develop and the tibiae become bent with the production of boomerang leg, practically always before puberty. Actual full blown cases of yaws were not seen but the association of the scars of the disease with the characteristic tibial deformities was a very close one. These scars are identical with those produced by yaws in the Northern Territories where yaws is well recognized and in the areas investigated syphilis is unknown.

The evolution of the pathological process is traced and Dr. Hackett makes references to some other bony changes which he thinks may be due to yaws including changes in the skull.

The high incidence of boomerang leg was remarkable and in the discussion some speakers suggested that a second factor might be involved. Diseased bones had been collected from widely separated areas in Australia and arguing from this Dr. Hackett suggested that in the past yaws had been widely diffused over Australia and had occurred among native groups living in non-tropical climates. In discussion it was pointed out that tropical and non-tropical climates must be differentiated from the climates within and without the geographical tropics.

H S S

LAMBERT (S. M.) A Yaws Campaign and an Epidemic of Poliomyelitis in Western Samoa.—*J. Trop. Med. & Hyg.* 1936. Feb 15 Vol. 39 No 4 pp 41-46

ALFREDO FARSEN (V) Contribución al estudio del pífan en Guatemala. [Yaws in Guatemala.] [Thesis presented to the Faculty of Medical Sciences National University Guatemala 1933 Feb]—44 pp With 3 figs. 1935 Guatemala Tipograf. Sánchez & de Guise

This is a graduation thesis and has the usual characters of works of that kind. The present might have been applied to the disease in any locality for it contains no figures regarding local prevalence in fact the only reference to Guatemala may be summed up in the conclusion that "Yaws exists in Guatemala, is endemic in a certain district Chocó in the Suchitepéquez department, and has probably been so for many years. The description is divided into sections dealing with the geographical distribution the spirochaete, its staining and cultivation experimental inoculation in monkeys the pathological anatomy symptoms prognosis and treatment. One looks in vain for a reasoned discussion of the unicist and dualist sides of the question of yaws and syphilis. The time-honoured list of text-book differences is given and a repetition of the statements that yaws does not affect mucosa or viscera etc.—each a mere *petitio principii*. The one difference which we have not seen stressed before is that in the discharge from yaws lesions the spirochaetes are numerous 6-8 per field, which is not the case with syphilis—an unsafe guide [the micro-photograph reproduced shows three]. There are notes of 6 cases and an appended bibliography showing the sources from which most of the statements have been culled.

H H S

VAN DER SCHAAER (P. J.) De liquor cerebrospinalis bij lijders aan framboesia tropica. [The Cerebrospinal Fluid in Tropical Yaws.]—*Geneesk. Tijdschr v Nederl Indië* 1936 Mar 31 Vol. 76 No 13 pp 784-804 [16 refs.]

A total of 129 cases was subjected to examination and care was taken to avoid the inclusion of cases of syphilis by attention to the history of the patient and any venereal lesions which he might carry. In 90 cases the cerebrospinal fluid showed no evidence of deviation from normal, while in 28 cases (24 per cent.) there was some indication of change. Positive Wassermann and Sachs-Georgi reactions can occur. More frequent was the finding of a positive protein reaction. Pleocytosis

was also included as a definite change in the condition of the cerebro-spinal fluid. One of the most noteworthy results of the research was that no change could ever be found in the fluid during the secondary or papular stage of the disease. This is significantly the stage when no doubt can exist as to the diagnosis between yaws and syphilis.

W. F. Harry.

CARMAN (John A.) A Case of Simultaneous Infection with Yaws and Primary Syphilis.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1935 Nov 25 Vol. 29 No. 3. pp. 281-283.

The title of this article might suggest that the patient contracted both yaws and syphilis at the same time but in truth it is the report of the case of an East African native who developed yaws in April in his native village contracted syphilis after intercourse with a native prostitute in Nairobi in the beginning of December. The evidence of yaws was a typical generalized granulomatous eruption, the evidence of syphilis was an indurated syrochaete-positive penile ulcer with generalized enlargement of lymphatic glands.

Dr J. H. SEQUEIRA who saw the case stated that while on the one hand the chancre was syphilitic without possible doubt, the granulomatous eruption was typical of yaws and never reproduced in syphilis.

H.S.S.

WILLIAMS (Herbert L.) Pathology of Yaws. Especially the Relation of Yaws to Syphilis.—*Arch. Pathology* 1935. Oct. Vol. 21 No. 4 pp. 596-630 With 12 figs. [80 refs.]

This article forms a very readable general review of yaws from its pathological aspect but contains no original contribution to our knowledge of the disease nor any facts not already known to readers of the *Bulletin*, while the author's conclusions differ hardly at all from those expressed from time to time by the reviewer.

H.S.S.

ACUÑA (Fernando) Juxta-Articular Nodules. Syphilitic Case Report and Review of Literature.—*Bol. Acad. Med. de Puerto Rico* 1935 Mar. Vol. 28. No. 5. pp. 89-102. With 4 figs. [14 refs.]

An account of a case of J.A.N. of 17 years standing in a 56-year-old Wassermann positive, male, white Porto Rican who had had syphilis at the age of 29. Nodules were present over each ulnar crest and a number were also present in both buttocks. Some account is given of the histo-pathological picture. This purports to be the first case of J.A.N. to be reported from Porto Rico.

H.S.S.

BREIJER (H. B. G.) EISRAUCH (E. M.) & HERMANS (E. H.) Nodules juxta-articulares. [Juxta-articular Nodules].—*Nederl. Tijdschr. v. Geneesk.* 1936. Mar. 14 Vol. 80. No. 11 pp. 1100-1102 French summary (5 lines).

These juxta-articular nodules develop in the subcutaneous tissue and exhibit three zones microscopically—a fibrous peripheral zone, a middle zone with young connective tissue cells, infiltration cells and macrophages and an innermost zone which may be hyaline or necrotic. The authors examined 1,450 Indonesians of the personnel of the Rotterdam Lloyd, of whom about 60 per cent were Madoerose and about 10

per cent Javans with the result that nodules were found in 2·2 per cent of the former and only 0·7 of the latter. A therapeutic test with neosalvarsan or neosalvarsan and bismuth caused the nodules slowly but surely to disappear. Microscopic examination of excised nodules however did not settle satisfactorily whether these nodules were due to yaws, syphilis or to some allied affection and the examination of spirochaetes in sections was inconclusive.

W F Harvey

NISHIYAMA (K) & NAGAHAMA (M) Ueber die Nodosités juxta articulares Jeanselme bei den Japanern mit besonderer Berücksichtigung des Röntgenbildes. [Juxta-Articular Nodules in the Japanese.]—Japanese Jl Dermat & Urol 1936 Feb Vol. 39 No. 2. [In Japanese pp. 152-165 With 15 figs. [15 refs.] German summary pp. 17-18.]

Two cases are recorded. The first a girl of 9½ years living near Osaka had suffered for 3 years from rheumatic pains in the joints. Examination showed numerous swellings to the size of a walnut the smallest being as large as a pea, situated on the extensor aspect of both wrists along the forearms on the dorsum of the right foot and the sole of the left. They were cystic and on puncture a greyish milky fluid was obtained in small amount containing cholesterol, lime and phosphate. [Some at least of these e.g. those along the bones of the forearm would seem to be true rheumatic nodes.]

The second was a man of 52 years who had served in the Russo-Japanese war but for three years had lived mainly near Osaka. He had suffered for 18 years from joint and tendon pains. The nodes in his case were largely about the joints—the carpal joints elbow knee and hip and at the insertion of the left tendo Achillis. They varied in size from a bean to a nut though they felt cystic nothing was obtained on puncture. Wassermann and Meissner reactions were negative in both cases. [From the general description and also from the situation these nodules should more likely be regarded as rheumatic or some of them perhaps as ganglia, rather than J.A.N. as named in the title. There was no history of yaws and the tests for syphilis were negative.]

H H S

NICOLETTI (Ferdinando) Su di un atypica elauopatia provocata. Contributo alla conoscenza dell'autolesionismo in infortunistica. [Lesion Artificially Produced by Injection of Oil.]—Riv Sanitaria Siciliana 1935 June 1 Vol. 23 No. 11 pp. 819-822 825-827 With 2 figs. [12 refs.] French summary (7 lines) [Summary appears also in Bulletin of Hygiene.]

The subject of this narrative was a bricklayer and mason aged 28 years who slipped and struck his right knee. The joint swelled and he was treated in hospital and kept under observation for 3 months. After another 3 months he again presented himself with four fairly distinct swellings about the right patella, the largest having a diameter of 5½ cm. with connexion with the overlying skin but slightly moveable on the subjacent tissue. Flexion of the knee was reduced to an angle of 125° but was overcome by passive movement. The swellings were thought at first to be fibro-sarcomata or bursal inflammatory effusions as sequelae of the injury. The patient stated they had developed quite rapidly. Suspicion however was aroused and a needle inserted.

Six of this series were inoculated with heterologous spirochaetes at the same time. Two yielded positive results among those who were negative to autoinoculation. Conclusion—Resistance to autoinoculation develops early and persists while active yaws lesions are present.

Sixty-seven yaws patients were inoculated with heterologous strains of yaws spirochaetes with the following results—

Duration of first infection in years	No. of patients	Results			
		Positive		Negative	
		Number	Per cent.	Number	Per cent.
Less than 1	18	12	75.0	4	25.0
1 to 3	14	10	71.5	4	28.5
3 to 8	18	8	44.4	10	55.6
10 to 65	19	3	15.8	16	84.2

Conclusion—Immunity develops to heterologous strains of spirochaetes the immunity varies according to the duration of the natural first infection. Several years may elapse before patients become refractory to this second inoculation. It was also shown that among this same group of 28 patients with active lesions 57.7 per cent. were refractory of 23 to whom treatment had been given and in whom the disease had been latent for less than 1 year 17.4 only were immune of 18 in whom latency had obtained for 2 years or more 53.3 per cent. were immune the latent stage having been preserved in some entirely in others in consequence of treatment.

Conclusion—The development of immunity is retarded by treatment which interrupts the normal course of the disease.

The types of lesion produced by inoculation were of two kinds—(a) proliferative either a single large framboesiform papule always containing spirochaetes or a collection of folliculo-papules with many organisms (b) destructive when no spirochaetes were found. There was no definite correlation between the type of lesion present in the naturally occurring disease and that produced by inoculation.

Conclusion—the current theory that destructive or granulomatous lesions are due to a changed reactivity of the body tissues need be accepted with caution.

The incubation period on inoculation of 33 persons was from 13 to 16 days. In 27 the incubation period was under 8 weeks. In 11 inoculated with virus from a single case, the lesion appeared in 6 in the 3rd week 3 in 4th week 2 in 5th week.

Ten persons with latent syphilis in whom the diagnosis seems fully assured were inoculated with *T. pertussis* known to be virulent for man. The result was negative in all.

Three groups of patients comprising respectively (a) 10 with yaws of less than 3 years duration, (b) 10 with yaws of 10 years duration or more and (c) 10 with latent syphilis were inoculated with the same testicular emulsion prepared from rabbits with yaws adjuvants controls being used. Ten per cent. only of (a) were immune, 80 per cent. of (b) and 100 per cent. of (c).

It is suggested that successive crops of lesions which are commonly seen in yaws might be due to reinfections a point of importance in the interpretation of the results of treatment.

It is pointed out that reliable information concerning cross immunity of the yaws patient to syphilis is not forthcoming and that even though many persons contract yaws in childhood their relatively susceptible period to syphilis may extend well beyond the adolescent years so that caution must be observed in assigning *T. pertenue* as the aetiological agent in the case of syphilis-like lesions of the cardio-vascular and nervous systems. In the individual case perhaps the most reliable method of arriving at a correct aetiological diagnosis is by recovery through rabbit inoculation of the one or the other treponema, with its characteristic disease picture from the lymph nodes or other organs of the affected person.

H S S

SERRA (G) Le salicylate de bismuth dans la thérapeutique du plan [Bismuth Salicylate In Treatment of Yaws].—*Bull Med du Katanga* 1935 Vol 12 No 5 pp 189 191-7 199-200

An article dealing with the method of preparation, mode of employment and advantages of bismuth salicylate in the treatment of yaws. 100 gm. bismuth salicylate after complete drying by heat for two or three hours are triturated in a mortar with 1 litre of ground-nut oil added slowly till a fine emulsion results this is then kept for 15-20 minutes on a water bath with the water boiling after which 10 gm. guaiacol is added. The dosage recommended is 1 cc per 10 kilo body weight intramuscularly into the buttock once a month for three to four months or 1 cc. per 15 kilo body weight once a week for five weeks. The injection is fairly painless no toxic effects were seen, early lesions disappear quickly it is cheap Such a course of treatment, however cannot be looked upon as curative. H S S

GOTAY (José B) COSTA MANDRI (O) & PAYNE (George C) The Intensive Method of Control applied to Yaws. A Preliminary Report.—*Puerto Rico Jl Public Health & Trop Med* 1935 Sept. Vol. 11 No 1 pp 91-101 With 4 figs. on 2 plates. [Spanish version pp 102-113]

A description of the results obtained by an intensive method of anti-yaws campaign.

In opening reference is made to the history of the disease in the island of Porto Rico. Introduced with negro slaves during the second and third decade of the 16th century it remained a widespread infection until slave trading was discontinued in 1835 after which the disease rapidly declined and thereafter appeared only in small localized endemic foci scattered throughout the island.

In 1902-03 there was noted an epidemic among school children in the NW corner of the island which was mistaken for syphilis and treated apparently with success with mercury and potassium iodide but from 1903 to 1917 nothing further was reported. In 1917 however cases were again noted and in 1931 an outbreak was signalled which forms the subject of this communication.

The intensive method of control consisted in —(a) A reconnaissance by a sanitary inspector in order to delimit the affected zone. (b) A census of the total population of that zone with notification of all cases

Six of this series were inoculated with heterologous spirochaetes at the same time. Two yielded positive results among those who were negative to autoinoculation. Conclusion—Resistance to autoinoculation develops early and persists while active yaws lesions are present.

Sixty-seven yaws patients were inoculated with heterologous strains of yaws spirochaetes with the following results—

Duration of first infection in years	No. of patients	Results			
		Positive		Negative	
		Number	Per cent.	Number	Per cent.
Less than 1	18	12	75.0	4	25
1 to 3	14	10	71.5	4	25
3 to 8	18	8	44.4	10	55.6
10 & over	19	3	15.8	16	84.2

Conclusion—Immunity develops to heterologous strains of spirochaetes—the immunity varies according to the duration of the initial first infection. Several years may elapse before patients become refractory to this second inoculation. It was also shown that among this same group of 67 patients with active lesions 57.7 per cent were refractory, of 23 to whom treatment had been given and in whom the disease had been latent for less than 1 year 17.4 only were immune, of 18 in whom latency had obtained for 2 years or more 83.3 per cent were immune, the latent stage having been preserved in some entirely, in others in consequence of treatment.

Conclusion—The development of immunity is retarded by treatment which interrupts the normal course of the disease.

The types of lesion produced by inoculation were of two kinds—(a) proliferative either a single large framboesiform papule always containing spirochaetes or a collection of folliculo-papules with scaly organisms. (b) destructive when no spirochaetes were found. There was no definite correlation between the type of lesion present in the naturally occurring disease and that produced by inoculation.

Conclusion—the current theory that destructive or gummatous-like lesions are due to a changed reactivity of the body tissues must be accepted with caution.

The incubation period on inoculation of 33 persons was from 13 to 24 days. In 27 the incubation period was under 6 weeks. In 11 inoculated with virus from a single case, the lesion appeared in 6 in the 3rd week, 3 in 4th week, 2 in 5th week.

Ten persons with latent syphilis in whom the diagnosis seems fully assured were inoculated with *T. pertussis* shown to be virulent for man. The result was negative in all.

Three groups of patients comprising respectively (a) 10 with yaws of less than 3 years duration, (b) 10 with yaws of 10 years duration or more, and (c) 10 with latent syphilis were inoculated with the same testicular emulsion prepared from rabbits with yaws, adequate control being used. Ten per cent only of (a) were immune 80 per cent. of (b) and 100 per cent of (c).

INDEX OF AUTHORS OR SOURCES.

The bracketed abbreviations after the page numbers indicate the subjects.
Page numbers within brackets indicate papers not summarized

Am	signifies Amoebiasis and Amoebic	Lep	signifies Leprosy
Bb	Beriberi and Epidemic Dropsey	Lept.	Leptospirosis.
Bl.	Blackwater	Mal.	Malaria.
B.R.	Book Review	Misc.	Miscellaneous.
Chl.	Cholera.	Oph.	Tropical Ophthalmology
C.Bu	Climatic Bubo and Lympho- granuloma Inguinale	Pel.	Pellagra.
Der.	Tropical Dermatology	Pl.	Plague.
Diet.	Deficiency Diseases.	Rab.	Rabies.
Dys.	Dysentery (Bacillary and Unclassed)	R.B.F	Rat Bite Fever
Fev.	Fevens.	R.F	Relapsing Fever and other Spirochaetoses.
Hel.	Helminthiasis.	Sn.	Venomous Snakes and Snakes Venoms.
Hist.	Historical.	Sp.	Sprue.
H.S.	Heat Stroke.	S.S.	Sleeping Sickness.
K.A.	Kala Azar	Y.F	Yellow Fever
		Y & S	Yaws and Syphilis.

A.

- Aara, C. G., 146 (Der.)
 Abeita, J. C., with Pender 521 (Bl.)
 Abocaya, A., with Zwin & Joyeux, 109
 (Hel.)
 Abraham, A. C., with Chenoy & Siddiqi, 961
 (Y & S)
 de Abreu, M., 315 (Lep.)
 Academy of Sciences of the USSR, 413
 (B.R.)
 Acandona, G., 502 (K.A.)
 Acton, H. W. & Dey N. C., 143 (Der.)
 Adachi, J., with Kuo, Takahara & Saito, 627
 (Misc.)
 Adalja, K. V., 270 (Mal.)
 Adams, A. R. D., 94, 105, 354 (Hel.) 482, 717
 (Misc.) 630 (S.S.)
 Adler, S., with Sergeant, Ed., 499 (K.A.)
 —, Theodor O. & Schieber, H., 683 (R.F.)
 Adler, M., with Mathis & Durieux, 340 (Y.F.)
 Africa, C. M. & Garcia, E. Y., 81, 104 (Hel.)
 —, with —, 687 (Hel.)
 —, — & Layco, J., 131 (Hel.)
 —, — & de Leon, W., 90 (Hel.)
 —, de Leon, W. & Garcia, E. Y., 560 bis
 (Hel.)
 Ahern, D. M., with Dogra, 103 (Hel.)
 Ahuja, M. L., 398 (Sn.)
 —, with Taylor, 375 (Chl.) 387 bis (Sn.)
 —, with — & Gurkirpal Singh, 377 (Chl.)
 di Alchberg, U., 597 (Hel.)
 Alda, T. (883) (Chl.)
 Alayon, F. (371) (Pl.)
 Albaro, V., 502 (K.A.)
 de Albuquerque, A. F. R., 601 (Lep.)
 de Alda Calleja, M., 780 (Plal.)
 Aleixo, A., 837 (Lep.)
 Alexander, F. D. & Meteney, H. E., 523 (Am.)
 Alfredo Fahsen, V., 963 (Y & S.)
 Alkata, J. E., 573, 591 (Hel.)
 Allan, J., 478 (Misc.)

- All Union Institute of Experimental Medicine
 (Vlem) 413 (B.R.)
 Alvarez, L. with Kouri, Basnuevo & Loscano,
 88, 558 (Hel.)
 Alvarez, J. R. with Arenas & Herrada, 951
 (Hel.)
 Alvira, W. D., 826 (Plal.)
 Amalfitano, G., 27 (K.A.)
 Ambialet, R., 283 (Plal.)
 Amendola, F., 452 (Oph.)
 de Amicia, A., 128 (Hel.)
 Amy, A. C., 236 (Plal.)
 Ancelot, A. with Lanboe & Prieur, 203 (S.S.)
 Anchazan, B., with Uriarte & Morales
 Villalon, 362, 370 (Pl.)
 Anderson, A. S. with Simpson, 291 (Mal.)
 Anderson, C., 18 (K.A.) 54 (R.F.)
 Anderson, H. H. & Anderson, J. van D., 302
 (Lep.)
 —, with Hurwitz, 934 (Lep.)
 —, with Reed, 540 (Am.)
 Anderson, J. van D. with Anderson, 302
 (Lep.)
 —, with Villeda & Castro, 940 (B.I.O.) (Lep.)
 Anderson, R. J., Crowder, J. A., Newman,
 M. S. & Stodola, F. H., 840 (Lep.)
 Andrews, M. N., 18 (K.A.)
 Andio, V. with Basnuevo, 549 (Hel.)
 —, with Bolafios, Kouri & Basnuevo 658
 (Hel.)
 Antigstein, L., 456 (Misc.)
 Annales de l'Institut Pasteur, 325 (Rab.)
 Annamaki, D. R. with Menon, 153 (Misc.)
 —, with — & Krishnaswami, 805 (K.A.)
 Anning, C. C. P., 423 (Fev.)
 Anton, H. with Hetach, (710) (Dys.)
 Antonina, L., 835 (Plal.)
 Aoki, I., 60 (Lept.)
 Appelman, M., 135 (Hel.)
 —, with Van den Branden, 180 (S.S.)
 —, with — & Pottier, 202, 683 (S.S.)
 Arantes, F. R., 314 (Lep.)

- Arar A. 118 (Hel.)
 Arata, B C with Battaglia, 580 (Hel.)
 Arbooa, A with Earle & Palacios, 837 (Mal.)
 Archives de l'Institut Pasteur de Tunis,
 376 (Rab.)
 Arenas, R Herrada M & Alvarez, J R.
 931 (Hel.)
 — with Rojas & Basaviera, 887 (Hel.)
 Arenas Martorell, R & Herrada Libre, M
 324 (Rab.)
 Argenich R with Urnaris & Passalacqua, R.
 281 (Pl.)
 Arnaud, J 258 (Mal.)
 Arnett, J H with Stahler & Weerich, 829
 (Am.)
 Arguedas da Escola Médico-Cirúrgica de Nova
 Goa, 294 (Lep.)
 Archer M with Klyler & Levine, 427 (Fev.)
 Ascione G & di Bello, G 208 (S.S.)
 Asencio, P 984 (V & S.)
 Atchley F O 711 (Dys.)
 Athavale V B. (316) (Lep.)
 Audier M with Olmer D & Olmer J 910
 (Fev.)
 Augustine, D L & Drinker C K 583 (Hel.)
 — with — & Leigh, 129 (Hel.)
 — with Thaler, 583 (Hel.)
 — with — & Spunk, 123 (Hel.)
 Araujo, L & Chaves A 24 (K.A.)
 Austin, C J 290, 599 (Lep.)
 Austin I D C with Wolf, 635 (Mic.)
 Austin, T A & Mayne E C 527, 528 (Am.)
 Autret, M with Genevaey Gachet &
 Dodera, 438 (Mic.)
 de Ayerbe, A P 100 (Hel.)
 Azim, M A with Khalil, 81, 853 (Hel.)
- B.
- Babat, J 333 (V.F.)
 — with Montel, Nguyen Ngoc Khanh &
 Do an Hoanh 944 (Lep.)
 Bacchelli G 932 (Hel.)
 Baer J G with Jouen, 86 (Hel.)
 Buffet, O with Niclau, 322 (Rab.)
 — with — & Mathas, 632 (V.F.)
 Baully J with Remlinger, 316, 320, 328
 741, 745 (Rab.)
 Baully J D with Covell, 280 (Mal.)
 — with — & Vidy a Prasad, 226 (Mal.)
 Bauza, F E (247) (Lep.), 1854 (Mal.)
 — with Howell, 457 (Mic.)
 Baker D D with Hissman, 381 (Hel.)
 Baker F C 285 (Mal.)
 Baker G A & Lubano, P C 302 (Sa.)
 Balashova, M T 23 (K.A.)
 Balfour, M C 773 (Mal.)
 Ballaga, S 143 (Der.)
 Baltazard, M 917 (Fev.)
 — with Blanc, 918, 919 (Fev.)
 — with — & Mour, 437, 924 (Fev.)
 Baltzana, I & Constantinesco, N 920 quad
 921 (Fev.)
 Baltzana, I with Lucia & Constantinesco,
 36, 923 bis (Fev.)
 Bambarra, C A with Barreales, 40 (Fev.)
 Bana, P D 618 (V.F.)
 Banerjee, D N 378 (Chi.)
 — & Datta, S K 378 (Chi.)
- Bank, L M (111) (Dys.)
 Banerjee, H with Patrika & Lal, 824 (Fw.)
 Barber M A with Carr & Maddeca, 28
 (Mal.)
 — & Rice, J B 253, 382 (Mal.)
 Barbosa, A 100, 789 (797) (Mal.)
 Barndt M with Troxler & Naem, 28
 (Lept.)
 Barkovitz, A 189 (S.S.)
 Barlow C H 93 (Hel.)
 Barnard, C C 844 (B.R.)
 Barnett, R 381 (Sa.)
 — with Macfarlane, 304 (Sa.)
 Barnett, L 100 (Hel.)
 Barros, J M 431 (Opk.)
 Basco, M with Tabangal, Perez &
 Rosario, 582 (Hel.)
 Basco, J & Andrade, V 149 (Hel.)
 Basco, J G with Bozzo, Espe &
 Andrade, 582 (Hel.)
 — with Calvo Fonseca & Kowal, 381 (B)
 — with — with Abram & Lucena, M 28
 (Hel.)
 — with — & Areias, 483 (B)
 — with Kowal & Calvo Fonseca, 29 (B)
 Bassler, A 705 (Am.)
 Bassi, R with Mauro & Germoni, 37 (S.S.)
 Bassi, V K 315 (Lep.)
 Battaglia, A & Arata, E C 582 (Bd.)
 Battaglia, M L & Urtaza, L 343 (Pl.)
 Brach, T de V 120, 586 (Hel.)
 Beechell, L M, 314, 800 (Lep.)
 — with Valente, 313 (Lep.)
 Beekmann and Protzmann, 703 (Bd.)
 Beckatt, H S 629 (Bd.)
 Beck, F J C 629 (Bd.)
 Beerna, J & Leyser, H 209 (Sa.)
 Behar, J C 148 (Der.)
 di Bello, G with Ascione, 206 (S.S.)
 di Benedetta, V 104 (K.A.)
 Benestad, G. (356) (M.D.F.)
 Bengtson, L A & Dyer, R E 411 (Fev.)
 Benhamou, L, Fangera, R & Chomel,
 21 (K.A.)
 — & Fourea, R 503 (K.A.)
 — & Galo, R 505 (K.A.) 783 (Bd.)
 Bonifac, C with Almeida & Janni, 57 (S.S.)
 Bennett, S C J 27 (K.A.)
 Bernade A, with Casas & Casas, 20 (Opk.)
 Bernas, W & Goettas, A 316 (Pl.)
 Berbaria, D A, with Turner & Dunn, M
 (564) (Hel.)
 Beretondo, J J & Masoch, T 1, 125 (S.S.)
 Berger, C with Le Chatton & Franchet,
 428, 517 (Fev.)
 — with — Bondon, Franchet &
 Debroux, 436 (Fev.)
 Berman, M with Klyler, 887 (S.S.)
 Birmingham, H J 337 (V.F.)
 Bernabe, J V & Basbarra, C A 48 (Fev.)
 Bernard, P M 880 (Chi.)
 Bernard, R with Chaud & Costa, 30, 37
 609 (K.A.)
 Berney P with Tassoud, 301 (Lep.)
 Berry H 936 (Lep.)
 Berry P 612 (Lep.)
 — with Stevens, 111 (Hel.), 305 (Lep.)

- Berrebi, J. 501 (K.A.)
 Berry, L. J., with Freeborn, 637 (Misc.)
 Berthier with Giraud, Giando & Prallaud,
 22 (F.A.)
 Bertrand, C., with Montastruc, 127 557 (Hel.)
 Bertrand, Y. 451 (Oph.)
 Berzi, A. (334) (Lept.)
 Bessem, N. 443 (Fev.)
 Besta, B & Mariani, G. 303 (Lep.)
 Beremer F. 474 (Misc.)
 Bezerra, A. (844) (Mal.)
 Bhaduri, B. N. 452 bis (Oph.)
 Bhattacharjee, N. C. 778 (Mal.)
 Bhattacharya, S. \ with Chopra, 403 (Diet.)
 —— with —— & Sen, 518 (Bl.)
 Bianchi, L. 601 (K.A.)
 Bieling, R. 701 (Am.)
 Bier O G. 305 610 (Lep.)
 Biffinger F with Lépane 808 (K.A.)
 Bindra, B. S. (955) (Hel.)
 Binkford, C. H. 933 (Lep.)
 Birnau, V. 338 (Y.F.)
 Bishop, P. C. 241 (637) (Misc.)
 —— & Smith, C. N. 483 (Misc.)
 Bizard, M. 238 (Mal.)
 Bjørn-Hansen, H. 519 (Bl.)
 Blackie, W. K. 951 (Hel.)
 Blacklock, D. R. & Southwell, T. 160 (B.R.)
 Blair A. W. 401 bis (Sa.)
 Blanc, G. 928 (Fev.)
 —— & Baltazard, M. 918, 919 (Fev.)
 —— & Martin, L. A. 429 (Fev.)
 —— & Noury M. 699 (R.B.F.) 921 924
 (Fev.)
 —— & Baltazard, M. 437 924 (Fev.)
 Blanchard, 456 458 (Misc.)
 Blanco, R. P Capurro F. G. & Dévé F.
 564 (Hel.)
 Boden 729 (Misc.)
 Bodet, H. (374) (Pl.)
 de Boer E. 105 674 (Hel.)
 de Boer H. S. 906 (Fev.)
 van Hogerhout, L. 657 (S.S.)
 —— with Bourguignonne & Van den Berghe,
 668 (S.S.)
 Bogliolo, L. & Greco Z. 22 (K.A.)
 —— with Liddo, 28 (K.A.)
 Bogofiwki, N. A. 838 (Mal.)
 Bogomolow I. L. with Kanarewskaja, 434
 (Fev.)
 Bohla, S. W. 422 (Fev.)
 Bolafon, J. M. Koerf, P. Anido \ &
 Basueva, J. G. 558 (Hel.)
 Boldyrs E. D. with Petrushevsky 98 (Hel.)
 Boenkov C. with Komlinger 70 (Sp.)
 Bonneau E. with Lalaget, 339 (Y.F.)
 Boenbakkier A. 873 (Pl.)
 Bonestell, A. E. with Koloid & McNeil, 80
 (Misc.)
 Bonne, C. 113 (Hel.) 211 (S.S.) 339 (Y.F.)
 —— & Stoker W. J. 231 (Mal.)
 Bonneau, E. with Durand 615 (Y.F.)
 Bonnefond A. with Martin & Rouemat, 620
 (Y.F.)
 Bonnel, with Sabranti, Lanneboegue &
 Dutréat, 333 (Lept.)
 Bonnin, H. 539 (Am.)
 —— with Carles, 539 (Am.)
 Boquet, P. with Cesari, 384 (Sa.)
 Bordjold, M. & Millochewitch, S. 139 (Der.)
 Borroca A. (312) (Lep.)
 Bose P. N. with Krishnan & Ghosh, 521 (Bl.)
 Boulin, with Labbe Uhry & Ullman 351
 (Lept.)
 Boulnois, J. 146 (Der.) 399 (Sa.)
 Boulos, A. 587 (Hel.)
 Bourgan, P. 264 (Mal.)
 — with Mansas & Nguyen van Tan,
 271 (Mal.)
 — & Nguyen van Tan, (228) (Mal.)
 Bourguignon, 667 (S.S.)
 Bourguignon G. C. 203 (S.S.)
 — & Van den Berghe L. with L. van
 Bogaert, 668 (S.S.)
 Bouvier G. 657 (S.S.)
 — with van Slype 915 (Fev.)
 Boyd, J. S. h. 417 809 (Fev.)
 Boyd M. F. 227 280 (Mal.)
 —— & Kitchen, S. F. 842 (Mal.)
 —— — & Mulrennan, J. A. 543 (Mal.)
 —— & Stratman-Thomas, W. R. 842 (Mal.)
 —— — & Kitchen, S. F. 240 842 bis
 (Mal.)
 —— — & MacEach, H. 779 (Mal.)
 Boyd R. & Rivierez, M. 145 (Der.)
 Bozzelli R. 318, 744 (Rab.)
 Bradley G. H. & McNeil, T. E. 488 (Misc.)
 Braga, R. 312 (Lep.)
 Braadt, R. & Horn, L. 268 (Mal.)
 Brada de Sá, L. J. with de Mello 259 (Mal.)
 Brault, with Le Gall & Seyberlich, 874 (Pl.)
 Breijer H. B. G. Elstach E. M. & Hermans,
 E. H. 904 (I. & S.)
 van Breugelghem, R. 842, 844 (Lep.)
 Breitling, R. 218 (Mal.)
 — Dalrymple-Champneys, W. Wiggles-
 worth, V. B. & others, 679 (Mal.)
 Brigham, G. D. 918 bis (Fev.)
 British Empire Leprosy Relief Association,
 598 (Lep.)
 British Film Institute 415 (B.R.)
 British Medical Journal, 230 279 (Mal.)
 365 (Hel.)
 Broc & Matthi, A. 553 (Hel.)
 Brodie M. with Goodman, 42 (Fev.)
 Brooke, G. E. 63 (Sp.)
 Brown, A. A. F. 470 (Misc.)
 Brown, A. F. 794 (Mal.)
 Brown, H. W. with Lamson, 577 (Hel.)
 Brown, J. A. K. 814 (Lep.)
 Brown, P. W. 542 (Am.)
 Browning, C. H. 183 (S.S.)
 Bruck, A. J. 903 (Oph.)
 Brug, S. L. (827) (Misc.)
 Brumpt, E. & Lavier G. 80 (Misc.)
 Brunelli, P. 718 (Misc.)
 Bruxelles-Médicale, (555) (Hel.)
 Brwynoghe R. & Jadin, J. 429 (Fev.)
 Buchanan, G. 78 (Misc.)
 de Bock, A. 227 240 (Mal.)
 — with Kruan & Swellengrebel, 283 (Mal.)
 — & Swellengrebel, \ H. 241 bis 242
 (Mal.)
 Bodelmann, G. & Kraatz, G. 518 (Bl.)
 de Boen, S. (19) (K.A.) (284) (Mal.)
 Bulletin de l'Académie de Médecine de
 Roumanie 908 (Fev.)

D.

- Dale W. C. 630 (Mus.)
 Dakka P. 223 (Mal.)
 — & La ergoe J. 783 (Mal.)
 Dalrymple-Champneys, W. with Briercliffe
 Wigleworth & others. 679 (Mal.)
 Dang J. M. L. 101 (Hel.)
 Dang M. G. Hemerway R. V. & Lau S.
 (77) (Mal.)
 Dang Hanh-Kien 524 (IR)
 Daniel L. A. (371) (Pl.)
 Darder E. & Menes A. 431 (Fev.)
 Darre H. & Mollaret P. 619 (A.F.)
 Darriba, A. R. 505 (Hel.)
 Da Gupta, B. M. with knowles & Sen. 700
 (R.B.F.)
 Das Gupta, C. R. with Nayer 803 (Mus.)
 Datta S. K. & th Basenjee 378 (Chi.)
 Daufresne M. with Vincent & Seguin. 692
 (R.F.)
 Da m J. B. 854 (SS.)
 Da m T. H. with Findlay 615 (A.F.)
 — with — Stefanopoulos & Nahaffy
 309 (I.F.)
 — with Gordon. 314 (IR)
 Da m Y. A. with Rozen & Martin. 345 (Am.)
 Da m. W. M. 637 (Mus.)
 Dawson W. T. Gingrich, W. & Holler E. D.
 779 (Mal.)
 Da H. B. & Kraway M. R. 931 (Hel.)
 D. L. F. 778 (Mal.)
 De M. N. & Chatterjee, K. 407 408 (Dent.)
 De N. with Chopra & Chowhan. 359 (Sa.)
 De roba F. E. 48 (Mal.)
 Debbarma C. Lal A. & Bhattacharya, M.
 (829) (Mal.)
 Delcourt P. 249 (Mal.)
 — Villain C. Martin, C. & Depoux, R.
 797 (Mal.)
 Defner R. D. & Campbell, T. C. 244 (Rab.)
 Degotte J. with Dubois. 303 (Lep.)
 De la Barrera J. M. 362 (Pl.)
 — & Ruete, M. 345 (Pl.)
 Delanoë F. 157 (Mus.) 449 (Oph.) 944
 (Lep.)
 Delbet P. 597 (Hel.)
 Delbore J. with Rapot. 33. 29 (Fev.)
 — with — guyen-van-Hoog &
 Ho-thieu-Van. 354 (Lep.) 433 (Fev.)
 Del Frade A. with Mour. 87 (Hel.)
 Del Rosario, F. with Hung. 853 (Mal.)
 — with Tahangui, Basica & Pasco. 552
 (Hel.)
 Del Toro Cano, F. 599 (Lep.)
 Delville J. P. 435 & (Fev.)
 Demdova, L. W. 237 (Mal.)
 Dempster M. with Benjak. 872 (Pl.)
 Denodale, R. with Fabiani. 24 (R.A.) 535
 (Am.)
 Denning, G. M. with Wagmore 254 (Lep.)
 Denza, E. W. with Turner & Berberian. 101
 (564) (Hel.)
 De Rivera, G. T. with Johnson. 675 (S.S.)
 Derville, P. (387) (Hel.)
 Drachiem, R. 832 (Am.)
 — with Dopter 631 (Am.)

- Des Esparza, J. Q. & Lafon, G. 396 (Lep.)
 — with — 803, 806 (Lep.)
 Despicio, B. P. 261 (Mal.)
 Dentlich, V. with Lovadina. 87 (R.F.)
 Désé, F. with Blanco & Capera. 34 (Mus.)
 Devignat, R. (375) (Pl.)
 Dew H. R. 100 (Hel.)
 Dey N. C. with Acton. 143 (Der.)
 Dhar J. 77 479 (Mus.)
 Dear Martha, L. 500 (Hel.)
 Dibold, H. 712 (Dys.)
 Duboi, C. G. with Faust. 226 (Mus.)
 Duck, J. C. (363) (Hel.)
 Dickson, R. W. 319 (Mus.)
 Djurak, J. E. A. M. 808 (Mus.)
 Dwivedi, O. A. with Hughes & Tinker.
 914 (Fev.)
 Dumitrescu-Speth, V. 23 (Fev.)
 Dumitrescu, C. C. & Popovici, A. 205 (Mus.)
 Dixon, D. S. with Walker. 620 (Mus.)
 Dixon, H. B. F. & Southern, D. W. 807 (Fev.)
 Dykstra, B. with de Lannoy. 476 (Der.)
 Dodd, M. C. with Grubitt, Lindy &
 Hendrick. 873 (SS.)
 Dodera, J. with Generay. 221 (Rab.)
 — with — Gossela & Astuti. 89
 (Mus.)
 Dodge, C. W. 870 (IR.)
 Dogra, J. R. & Abora, D. M. 103 (Mus.)
 Donatoni, A. & Lestocq, F. 264 & 2. 11
 46 (Fev.) 923 (Fev.)
 — with — 307 (Mus.)
 Doornbos, W. 378, 379 (C.M.)
 Dopter C. & Drachiem, R. 831 (Am.)
 Dorode, P. & Ngoy-guang-ly 309 (Lep.)
 — — — Hayek-van-Hey & Inezem.
 742 (Lep.)
 Dostrovsky A. 21 (R.A.)
 Dostrovsky A. 297 (Lep.)
 Douai, J. A., Rodriguez, J. V. Costa I.
 & Pintilla, P. C. 901 (Lep.)
 Do van Hoanh, with Moncal, Bilk &
 Nguyen Ngoc Chau. 944 (Lep.)
 — with — Levan-Poung, Vnay et
 Khai, Tran-van-Hiep, Truong-nan &
 Nguyen-ego, Vinh. 319 (Lep.)
 Dreesen, W. C. with Williams. 24. 43
 (I.F.)
 Drinker C. K. with Augustine. 365 (Mus.)
 — — — & Leigh, O. C. 129 (Hel.)
 Driollet, E. with Marca. 211 (SS.)
 Drummond, R. (227) (Mal.)
 Dubois, A. 283, 308 942 (Lep.)
 — & Degotte J. 303 (Lep.)
 — with Gavillor. 616 (Lep.)
 — & Voil, G. 439 (Fev.)
 Dubreuil, J. with Le Chaton, Monet &
 Berge & Pramanick. 433 (Fev.)
 Duclerc J. with Vattas-Lamme. 808 (Fev.)
 Duggan, J. V. & Vaarala, B. P. 803 (Mus.)
 Duke, H. L. 179, 186, 207 641, 652, 65
 (S.S.)
 — & Mellanby, R. 822 (S.S.)
 Dunham, G. C. (303) (Lep.)
 Dupoux, R. with Decourt, Villal & Miral.
 327 (Mal.)

- Dupoux, R., with Villain, 782 bis (Mal.)
 Dupuy 848 (S.S.)
 Durand, R. & Bonneau, E., 615 (Y.F.)
 — with Laligret, 427 (Fev.)
 Durieux, C., 916 (Fev.)
 — with Mathis & Adviser 340 (I.F.)
 Du Soleil, G., with Houssaud, 156 (Alb.)
 Du Toit, P. J., 668 (S.S.) 749 (Rab.)
 Dutrétiot, J., with Sabraza, Lannetongue &
 Bonnel, 353 (Lept.)
 Duverger M. with Fourrier & Genova, 500
 (K.A.)
 Dyckerhoff, H., 547 (Am.)
 Dyer R. E. with Bengston, 441 (Fev.)
 Dyke, H. W., 783 (Mal.)
 Dren, M. I. & In, H. 887 (Ch.)
- E.
- Earie, W. C., Palacko, L. D. & Arbona, A.
 837 (Mal.)
 Eddie, B. with Meyer 871 (Pl.)
 Edgar V. H., 856 (Hel.)
 Edney J. M. with Dolf, 122 (Hel.)
 Egan, C. H. 553 (Hel.)
 Egypt, 452 (Oph.)
 Eliechto, A. (781) 774 (Mal.)
 El-Bibawi, A., 644 (Am.)
 Ellis, C. with Purcaro 529 (Am.)
 Ellison, F. O'B. 693 (Mal.)
 El-Salam, A. A. 95 (Hel.)
 Elsbach, E. M. with Breijer & Hermans,
 984 (I & S.)
 Emmons, C. W. with Carrón, 472 (Misc.)
 d'Empaire J. R. H. (376) (Hel.)
 Enzeling, J. A. M. J. 69 (Sp.)
 Epstein, E. 643 (Am.)
 Epstein, G. W. & Silvers, I. L., 919 (Fev.)
 — & Exemplarikaya, E. V. 919
 (Fev.)
 Erber B., 354 (Lept.)
 — with McLaren, 359 bis (Lept.)
 Eri, L. A. with Peck & Crimmins, 395 (Sn.)
 Escalar G. with Poco, 737 (Mal.)
 Escamor, E. 63 (Fev.) 631 (Misc.)
 — & Chaves Velando, L. A., 808 (Misc.)
 Eskridge L. with Hegner 713 du (Dys.)
 Esmeirard, J., with Joyeux & Sédat, 135
 (Hel.)
 Explan, M. with Le Gac & Hartmann, 952
 (Hel.)
 Espié A. 87 (Hel.)
 Esred, W. F. R., 666 (I & S.)
 — with Hidayat, 609 (R.B.F.)
 Esser P. H., 300 (605) (Lep.)
 Esser W. with Geesner 492 (Misc.)
 Eubanks, F. 802 (Lep.)
 Evans, A. M. 848 (Mal.)
 — & Walker, G. R., 346 (I.F.)
 Evans, H. L. 623 (Misc.)
 Exemplarikaya, E. V. with Epstein & Silvers,
 919 (Fev.)
- F
- Fabbani, G. 304 (Lep.)
 — & Dendale, R. 24 (K.A.) 535 (Am.)
- Fahre, with Mercier & Soalage 910 (Fev.)
 Fadda S., 257 (782) (Mal.)
 Faddeeva, T. with Iwanowsky 876 (Pl.)
 — & Tschernobaw W. 875 (Pl.)
 Fairley, A. H. 68 (Sp.)
 — & Mackie F. P., 471 (Misc.)
 Fangs, 853 (Hel.)
 Fannaud, E. (234) (Mal.)
 Farland N. E., 763 (Mal.)
 Faugier, R. with Benhamou & Choennat, 21
 (K.A.)
 Faust, E. C. 94 119 (Hel.)
 — & Diboll, C. G. 290 (Mal.)
 — & Headlee W. H., (551) (Hel.)
 — & Martinez, W. H. 137 (Hel.)
 — with Riley & Cook, 280 (Mal.)
 — with Sayad & Johnson, 898 (Hel.)
 — & Swartwelder J. C. 547 (Am.)
 Favorskowa, B. with Joukov Werejnikow
 371 (Pl.)
 — with Soskina, Joukov Werejnikow
 & Kasareva 877 (Pl.)
 Federated Malay States, 220 834 (Mal.) 458,
 460 (Misc.) 890 (B.R.)
 Felix, A. 32 (Fev.)
 Feng L. C. 125 (Hel.) 486 (Misc.)
 — & Yao, K. F. 125 (Hel.)
 Fenjuk, B. & Demjašev 31 872 (Pl.)
 Fernoselle Bacardi, J. J. with Portendo del
 Pozo 585 (Hel.)
 Fernández, A. J. 272 (Mal.)
 Fernandez, J. (I. M. 607 (Lep.)
 — & Schajzman, S. 311 (Lep.)
 Fernandez Valder, A. with Gimeno de Sande
 601 (Lep.)
 Fernando P. B. & Sandarangara, A. P.,
 657 (Mal.)
 — & Wiherama, E. M. 275 (Mal.)
 Fernando S. E. 140 (Der.)
 Feron, (945) (Lep.)
 Ferrer J. with Vollaret 351 (Lept.)
 Flalho, A. 145 (Der.)
 Field, J. W. & Davis, J. C. 798 (Mal.)
 Findlay G. V. & Davey, T. H., 615 (I.F.)
 — & Mahaffy A. F. 342 (I.F.)
 — Strianopoulis G. J., Davey T. H. &
 Mahaffy A. F. 339 (I.F.)
 — & Stern, R. O. 340 (I.F.)
 Finlayson, M. H. 402 (Sn.)
 Flischl, V. 614 (Lep.)
 Fisk, R. T. with Hoyt & Moore 323 (Rab.)
 Flecker H. 722 (Misc.)
 Fleucher D. 405 (Duet.)
 Fletcher A. H. 258 (Mal.)
 Fletcher W. 32 (Fev.)
 Flippas, H. F. 927 (Fev.)
 da Fonseca, F. 424 (Fev.) 502 (K.A.)
 Fourrier C. E. & Zia, L. S., 16 (K.A.)
 — with — 18 (K.A.)
 Fosen, A. 833 (B.R.)
 — with Müller, 158 (Misc.)
 Foster A. O., 119 bis (Hel.)
 Fourie, R. with Benhamou, 803 (K.A.)
 Fourie L. 671 (Pl.)
 Fourrier J. Genova, A. & Duverger 31 500
 (K.A.)
 Fox, H. 140 144 (Der.)
 Foy H. & Kondi, A. 511 (Bl.) 549 (Hel.)
 — — — & Peristemi, S. L. 793 (Mal.)

- Hu, S. M. K. 146 (Hel) 54 255 (Hel)
— with Toomreoff, 849 (Hel)
Huard, P. & May M. (Ed.) (Am)
— & Meyer Ver J. 727 (B.R.)
— with — 638 (Am)
— Resnick, M. & Hayab-Tan-Dor, 539
(Am)
Hudson, E. H. 898 (A. & S.)
Hueck O. 205 (Lep.)
Huot, P. C. with Laurent-Lavastine &
Korenman 383 (Soc.)
Huff C. C. 272 777 (Hel.)
Hughes, J. C. Dietelbaum O. A. & Tebbutt,
A. H. 914 (Hel.)
Hughes, T. P. with Gordon 624 (A. F.)
Huitenga I. S. (1951) (Lep.)
Huber C. R. with O'Connor 892 (Hel.)
Humphries, R. M. & Mayne F. S. 509 (K.A.)
Hunziker H. F. Jr. 94 (Hel.)
Hungary A. V. 69 663 (Hel.)
van Huysse J. H. F. E. 859 (Cal.)
Hunt E. W. 43 (Rab.)
Hurniak E. & Anderson H. H. 934 (Lep.)
Hwang N. Huiw with Dorode Yeo-Quang
Li & Tra an-Tam, 612 (Lep.)
Hayab-Tan-Dor with Huard & Resnick, 539
(Am)
- I
- Iezaa, J. I. 990 (Pl.)
Ide K. 859 (Rab.)
Igumenov A. S. 890 (Hel.)
Ikeda, D. J. 158 (Der.)
Ilina, B. with Tikhonova & Segorskaja, 368
(Pl.)
Inciar, C. & Santacarino, V. 481 (Mus.)
Indian Medical Gazette 107 (Hel.) 406
(Diet) 791 (Hel.)
Indrapuri S. 203 (Mus.)
Inhaber H. E. (1950) (Hel.)
Innes J. K. (1944) (Lep.)
Inoue K. with Yamada, 830 (Am.)
International Journal of Leprony 40(1),
600 (Lep.)
Ioff I. with Bensachra & Tidow (879) (Pl.)
Iraq 702 (Mus.)
Isahimanki, M. Lewison I. & Tschirhart, 2
317 (Rab.)
Itazumaya L. S. with pedojan, 259 (Hel.)
Iwanic, M. 778 (Rab.)
Iwanowskiy N. & Tadeeva, T. 878 (Pl.)
Iwata, S. 98 (Der.)
Iyengar K. R. K. 221 (Rab.)
Iyengar M. O. T. 894 (Hel.)
Izaguirre, A. with Calleja, 209 (S.S.)
Izumi, M. 361 (Hel.)
- J
- Jackson R. 239 (Hel.)
Jackson, R. B. 260 (Hel.)
Jackson, S. 514 (Rab.)
Jacobelli, E. 779 (Hel.)
Jacobs, W. P. Kuddieck J. P. & Sweet,
W. C. 112 (Hel.)
Jacobs, I. with Castellani, 138 (Der.)
Jadin, J. with Brumagne 429 (Plv.)
Jainica, 623 (Mus.)
- James, J. F. 439 (Mus.)
James, S. P. 212, 228 837 (Hel.) 333 (Pl.)
— Klein, W. D. & Shantz P. G. 894 (Hel.)
— Janca, M. & v. Janca, H. 254 (Pl.)
— & Kordik, E. 38 (Rab.)
Jandl, E. Z. with Marz & Beutler, 615 (Pl.)
Janes, M. H. with Keller & Lester, 82
(Hel.)
Jenner R. & Jones, E. B. 46 (Pl.)
de Jonge, Z. (1950) (Hel.)
Jettmar, H. M. 79 (Mus.)
Johnson, C. M. & De Riba, C. T. 875 (Pl.)
Johnson, V. M. with Sayad & Fawcett,
(Hel.)
Johnstone, H. G. with Read, 61 (Pl.)
Johns, E. (1947) (Pl.)
Jones, H. B. with Jeremy 80 (Hel.)
Jones, T. L. & Knipper, A. A. 106 (Hel.)
Joncasco D. 747 (Rab.)
— with Proca, 744 (Rab.)
Jordan, P. 811 (Lep.)
Jorge, A. L. da Silva, J. F. & Lobo, A. E. 39
(Pl.)
Jorge R. 18 (K.A.) 537 (Pl.)
Jock, M. 21 (Dys.)
Jokob-Wernsdorff V. & Fassina, B.
371 (Pl.)
— with Seckauer, Fassina & Kast
zawa, 877 (Pl.)
Journal of the Royal Army Medical Corp.
478 (Mus.)
Joyce, C. & Barr, J. G. 86 (Hel.)
— Sadas, J. & Eschweiler, J. 135 (Mus.)
— with Zwits & Abouwya, 119 (Mus.)
Jellinger, L. A. & Harmer, E. W. 146 (Rab.)
(Oph.)
Junior J. de M. 314 (Lep.)
Junior R. 837 (Lep.)
Junior L. R. 479 (Mus.)
- K
- Kabler P. 822 (Am.)
Kalebochov N. & Kremly W. 279 (Pl.)
Kalanterian, H. W. 548 (Hel.)
Kan, H. & Hung, J. (1950) (Hel.)
Kan, H. C. 938 (Hel.)
Kaparenskaja, A. A. & Bogomolov L. L.
434 (Plv.)
Kawanishi, K. Yagi & Sato, 743 (Rab.)
Kanda, K. 448 (Oph.)
Kaneko, K. 60 (Lep.)
Kang, H. J. with Chung 584 (Hel.)
Kaper N. L. 378 (Cal.)
Kapento, M. L. 200 (S.S.)
Karachchandras, P. V. 124 (Hel.)
Karapetjan, E. G. 273 (Plv.)
Karnach, (797) (Mus.)
Karnikar, W. A. E. 270 (Mus.)
— with Cameron, 506 (Hel.)
Kawamura, K. with Seckauer, Fassina &
Kastzawa, 877 (Pl.)
Kearns, I. A. 31 (Rab.)
Keattan, H. 763 (Mus.)
Kera, Z. M. 894 (Hel.)
Kawamura, K. 802 (Plv.)
Kawase, H., with Komuro & Tan, 353 (Rab.)

- Kedrowsky W. L. 543 (Lep.)
 kehar N. D. 796 bis (Mal.)
 Kekouloukhes, I., with Gnochvili & Mour
 gni, 790 (Mal.)
 Keil, E. (301) (Lep.)
 Kellaway C. H. & Williams F. E. 385 (Sn.)
 Keller A. E., Googe J. T., Cottrell, H. B.
 Miller D. G., Jr & Harvey R. H. 533
 (Hel.)
 — & Leathers, W. S. 573 (Hel.)
 — with — 580 (Hel.)
 — — & Jensen, M. H. 551 (Hel.)
 Kellaberger E. R. 661 (S.S.)
 Kellogg, W. H. 363 (Pl.)
 Kemp H. A. Mountford, W. H. & Wright,
 H. E. 347 (R.F.)
 Kenawy M. R. with Day 951 (Hel.)
 Hendrick, J. F. with Jacobs & Sweet, 112
 (Hel.)
 Kennedy W. P. & Mackay I. 480 (Mic.)
 Kenya Colony & Protectorate, 463 (Mic.)
 Kerr K. B. 104 (Hel.)
 Keruzze P. M. T. with Holiday & Smith,
 478 (Mic.)
 Kerzner V. P. with Chodakow & Petrov
 500 (R.A.)
 — with — & Sofiev 506 (R.A.)
 Keya, S. with Thomas, 778 (Mal.)
 Khalil, M. 17 (R.A.) 127 957 bis (Hel.)
 — 450 (Oph.)
 — & Azmi M. A. 92 953 (Hel.)
 — & Sabah, M. 112 (Hel.)
 Khaw O. K. 97 (Hel.)
 Kikuchi, W. & Verstrich, D. H. 301 (Lep.)
 King, P. Z. with Liu, 454 (Mic.)
 King, W. V. & Del Rosario, F. 853 (Mal.)
 Kingbury A. V. 220 834 (Mal.) 460 (Mic.)
 880 (B.R.)
 Kingpole, A. A. with Jones, 106 (Hel.)
 Kirby Smith, J. L. 117 (Hel.)
 Kirk, J. B. 462 (Mic.) 554 (Hel.)
 — & Centm, A. Y. 108 (Hel.)
 Kirwan, E. O'G. 451 904 (Oph.)
 Kitabatake, E. & Liu, H. P. 473 (Mic.)
 Kitchen, S. F. with Boyd, 842 (Mal.)
 — with — & Minkerman, 543 (Mal.)
 — with — & Stratman-Thomas 240
 842 bis (Mal.)
 Klinger, L. J., Aschner M. & Levine, S. 427
 (Fev.)
 — & Berman, M. 687 (S.S.)
 — & Comaroff, R. 205 (S.S.)
 von Klobotsky, D. 380 381 (Sn.)
 Knipfer A. 147 (Dec.)
 Knott, J. 129 (Hel.) 602 (Lep.)
 knowles, R. 840 (Mal.)
 — Das Gupta, B. M. & Sen, S. 700
 (R.B.F.)
 Ko, H. with To, 561 (Hel.)
 Kobashi, S. with Nakamura & Matsumoto
 308 (Lep.)
 Kodama, M. 42 (Fev.)
 kodyat, R. with Stanala, 934 (Lep.)
 Kochlin, D. with Marchoux & Chorizie, 57
 (R.F.) 307 (Lep.)
 Eccoid, C. A. McNeil, E. & Bonestell, A. E.
 80 (Mic.)
 — Wood, F. D. & McNeil, E. 67 (S.S.)
 Koels, G. M. & Cooley, R. A. 693 (R.F.)
- Koster D. 701 (Am.)
 Kousan Nayar, H. with Wright, 450 (Orb.)
 Koutya, Y., Kawana, H. & Tao S. C. 538
 948 quad (Hel.)
 Kamp W. H. W. & Clark, H. C. 833 (Mal.)
 Koudi, A. with Fox 511 (BL) 549 (Hel.)
 — with — & Peristens 793 (Mal.)
 Kopciowska, L. 317 (Rab.)
 Koresos, V. T. with Langel Lavastine &
 Huff, 393 (Sal.)
 Korobkova, E. 883 (Ch.)
 Korovitzky L. h. with Tscharkes & Litvack,
 805 (Mic.)
 Kotora, S. 59 60 (Lept.)
 Kozan, P. 88 (Hel.)
 — & Basnava, J. G. 632 (Mic.)
 — — — & Arora, R. 587 (Hel.)
 — — — Alvert, L. & Lescano, O. 88 558
 (Hel.)
 — with Bolafos, Arido & Basnava 538
 (Hel.)
 — with Calvo Fonseca, R. & Basnava
 J. G., 550 (Hel.)
 — with — & — 103 550 (Hel.)
 — & Del Frade, A. 87 (Hel.)
 — & Seltek, A. 588 (Hel.)
 — & Valverde, A. 29 bis (Hel.)
 Kourilsky R. & Mamoc, H. 332 (Lept.)
 Kossa, 509 (R.A.)
 Kouwenaar W. & Wolff, J. W. 442 (Fev.)
 — with — 49 421 (Fev.)
 Kraan, H. de Boek, A. & Swellempezel,
 H. 238 (Mal.)
 Kraatz, G. with Bodekman 518 (BL)
 Krause, M. with Collier 192 (S.S.)
 Krishnan, R. V., Chopra, R. V. & Mukherjee,
 S. V. 79 (Mic.)
 — Ghosh, B. J. L. & Bose, P. V. 521 (BL)
 — & Pal, V. G. 517 (BL)
 Krishnaswami, T. K. with Meeson, 81 (Mic.)
 — with — & Imambara, 505 (R.A.)
 Kriz, J. R. 939 (Lep.)
 Kreber F. 694 (R.F.) 786 (Mal.)
 Keba, M. 517 bis (BL) 704 (Am.) 788 (Mal.)
 Kubota, A. 373 (Ch.)
 Kumm, H. W. 961 (Fev.) (I. & S.)
 — with Saunders & Renne, 940 (Y & S.)
 — & Turner, T. B. 961 (I. & S.)
 Kusert, H. with Schilling Schreck & von
 mann, 195 664 (S.S.)
 Kung J. C. with Kao, 933 (Hel.)
 Kuo, E. W., Takahara, K., Adachi, J. &
 Saito, K. 627 (Mic.)
 Kurachi, K. & Homma, H. 87 (PL)
 Kurada, O. 828 (Fev.)
 Kurynes, C. A. 432 (Fev.)
 Kuznetsov V. J. 368 (PL)
 Kyu, K. with To 546 Am.)
- L
- Lauke, E. W. with Parikh, 488 (Mic.)
 Labbe, M., Bouilla, Ulry & Ullman, 351
 (Lept.)
 La Cava, G. 363 (Mal.)
 Lafuma, J. with Meersman, (34) 84 bis (Mal.)
 Lagondaky S. 609 (Lep.)

- Lahiri, S. C. 373 (Chi.)
 Lal, D. G. & Chen, W. Y. 941 (Lep.)
 — Li, Y. J. & Chang, W. 254 (Mal.)
 Langseth, Larstine, Hest, P. C. & Kornblow,
 N. T. 323 (Sci.)
 Larget, 620 (Y. F.)
 Larget, J. 339 (Y. F.)
 — & Boeau, E. 339 (Y. F.)
 — & Durand, R. 477 (Fev.)
 — & th. Nacolle, 34 437 619 (Fev.)
 — with Bellard, 618 (Y. F.)
 Lal, S. with Paesche & Bannister, 926 (Fev.)
 Lambert, M. 583 (Mal.) (963) (1 & 9)
 Lamborn, W. A. & Howat, C. H. 654 (SS.)
 Lambotte, J. 545 (Mal.)
 Lampe, F. H. J. & de Moor, C. E. 307 945
 (Lep.)
 Lamprecht, B. A. with Ramsey & Chandra,
 843 (Mal.)
 Lampropis, P. D. & Brown, H. W. 577 (Hel.)
 Lancet 553 (Mal.) 638 (Misc.)
 Lande, E. & Nagata, R. 577 (Hel.)
 Lane, C. 129 (Hel.)
 Langan, A. M. & Mathew, R. J. 41 (Fev.)
 Langdon-Brown, W. 72 (Misc.)
 de Lange, C. D. 72 150 (Misc.)
 — & D'Yachan, B. 408 (Derm.)
 — with Lichtenstein, 161 (B.R.)
 — & Sturm, C. J. (94) (Mal.)
 Laontongse, S. with Sabrata, Dautert &
 Boonpi, 353 (Lept.)
 Lara & de Vera, (94) (Lep.)
 Larrouste, F. 564 (Hel.)
 Larrea, A. E. 454 (Misc.)
 Larthe, V. with Sauerac, 654 (SS.)
 Latnet, 30 (Fe.)
 Latvcher, V. 349 (R.F.)
 Lau, S. with Dang & Hemmaway (777)
 (Mal.)
 Lawton, L. 203 (SS.)
 — Preuer, M. & Asenstor, A. 203 (SS.)
 Lavergne, J. 114 (Hel.)
 — with Dakka, 763 (Mal.)
 Lavieck, J. V. 699 (R.B.F.)
 Lavay, G. with Brumpt, 80 (Misc.)
 Lawrence, H. 145 147 (Der.)
 Lawson, H. A. with Castle Rhonda & Payne,
 68 (Sp.)
 Layco, J. with Afreca & Garcia, 131 (Hel.)
 Leal, A. E. with Jorge & de Silva, 746 (Mal.)
 Leathers, W. S. & Keller, A. E., 580 (Hel.)
 — with — 573 (Hel.)
 — with — & Jensen, 581 (Hel.)
 Le Bahar, A. 748 (Rab.)
 Le Chatton, F. Berge, C. & Peanantech, J.
 438 927 (Fev.)
 — Monod, H. Berge, C. Peanantech, J.
 & Debret, J. 438 (Fev.)
 Ledentz, G. 460 (Misc.)
 Lee, C. U. & Cha, C. F. 20 (K.A.)
 — & Cha, H. J. 96 (Hel.)
 — & Chang, H. L. 97 (Hel.) 503 (K.A.)
 — with — 103 (Hel.)
 Lee, D. H. K. 628 (Misc.)
 Leeson, H. S. 879 (Pl.)
 Lehroa, G. 608 942 (Lep.)
 — & Des Escault, J. Q. 608, 936 (Lep.)
 — with — 296 (Lep.)
 Lega, G. with Raffaele, 844 (Mal.)
 Le Gac, P. Espia, M. & Rameau, L. E.
 (Hel.)
 Le Gall, Seyberth & Braut, 874 (Pl.)
 Legoux, R. & Lwo, A. 238 (Sci.)
 Leigh, O. C. with Dreher & Augustine, D.
 (Hel.)
 Leiper, R. T. 347 (Hel.)
 Leiss, S. E. with Rosefield, 393 (Sci.)
 Lester, F. A. 121 (Hel.)
 Lea, T. L. 97 (Hel.)
 de Leon, W. with Afreca & Garcia, 87 84
 105 (Hel.)
 Lepine, P. 318, 221 (Rab.), 42, 58 (Fev.)
 — & Balfinger, P. 805 (K.A.)
 — & Crevenhaier, L. 317 (Rab.)
 — & Lorand, V. 46, 91 (Fev.)
 — & Marques, J. 412 (Lep.)
 — & Saettler, I. 326 (Rab.), 43 (Fev.)
 Le Port, L. R. 177 (55)
 Leprosy in India, 223, 524, 533 (Fev.)
 Leprosy Review, 292, 293, 303, 305 (Fev.)
 Leroux, J. with Guillain, 231 (Lept.)
 Lessana, O. with Koell, Bannister & Lutz,
 88, 338 (Hel.)
 Lester, H. M. O. 189 (SS.)
 — with Lorier, Margaloyd, Gyn. Hahn
 & Ross, 639 (SS.)
 Letourneau, F. & Doat, 807 (K.A.)
 — with — 29 (K.A.), 46, 50 (Fev.)
 Levach, C. & Devosch, V. 57 (R.F.)
 — & Schora, R. 318, 319, 324, 78 (963)
 Levins-Piaget, with Molet, 87 (Fev.)
 — with — "Spermatophores des
 van-Hank, De-van-Henk, Trichoptera,
 Qas & Ngarranggaro-Chua, 20 (Fev.)
 Lewin, S. with Miller & Ashton, 123 (Fev.)
 Levy, H. with Serageld, 319 (R.F.)
 Lewis, D. J. with Hackett, 843 (Sci.)
 Lewis, M. J. 423 (Fev.)
 Lewthwaite, R. 433 (Fev.)
 — & Savoie, S. B. 424, 511, 521, 522
 (Fev.)
 Lewin, I. with Inabokadi & Tahirkheli,
 317 (Rab.)
 Libman, C. 497 (Misc.)
 Libermann, J. & Frimberg-Blom, 42 (Fev.)
 Li, C. C. with Chang & Yousif, 22 (Sci.)
 Li, Y. J. with Lai & Chang, 254 (Sci.)
 Lichtenstein, A. with de Lemos, 32 (K.A.)
 Liddo, S. & Dogherty, L. 28 (K.A.)
 Liu, H. P. 603, 605 (Lep.)
 Lubin, R. D. 441 (Fev.)
 Lima, C. de F. 316 (Rab.)
 Lima, E. de Q. with Torre, 743 (Rab.)
 Lima, L. de S. 504 515 (Lep.)
 Lindberg, A. (1969) 966 (Hel.)
 Lindemann, S. J. L. & L. bora, R. S. J. M.
 (Hel.)
 Linda, W. D. with Crockett, Headrick &
 Dodd, 673 (SS.)
 Ling, L. C. 47 (Sci.)
 Link, T. 381 (Sci.)
 Linton, R. W. Akira, B. Y. & Melick, D. S.
 373 (Chi.)
 — — — & Seal, S. C. (378) (Sci.)
 Linwarts, J. J. 778 (Mal.)
 Lipacasa, F. S. 505 (Hel.)
 Lipstein, I. 694 (R.F.)
 Lister, S. 82 (B.R.)

- Litvack, J. I., with Tschirkeas, L. A. & Horovitzky 805 (Misc.)
 Liu, J. H. & King, P. Z., 454 (Misc.)
 Liu, K. P., with Kitabatake 473 (Misc.)
 Livierato, S. G. & Salata, C. C., (784) (Mal.)
 Livon, J., with Violle 744 (Rab.)
 Li Yean Po, 893 (R.F.)
 Lloyd, B. J., 616 (Y.F.)
 Lloyd, H. M., 653 (S.S.)
 Lloyd, W., 333 (Y.F.)
 — & Mahaffy A. F. 624 (Y.F.)
 — Theiler M. & Ricci, N. I., 623 (Y.F.)
 Lobel, L. W. M., 846 (Lep.)
 Losper M. & collaborators, 327 (B.R.)
 Loewenthal, L. J. A., 404 (Diet.)
 — with Hooper 718 (Misc.)
 van Loghem, J. J., 435 (Fev.)
 Loh, V. T. & Tai, T. Y., 860 (Chl.)
 Lombardo, V., 538 (Am.)
 Long, J. D., 878 (Pl.)
Longmans African Hygiene Pictures, 167 (B.R.)
 Lourando, N., 37 (Fev.)
 — with Lépine 46 912 (Fev.)
 Loumalgne, with Samner 62 (Fev.)
 Loureiro, L. F. D. E., 320 (Rab.)
 Lovett-Campbell, A. C., 555 (Hed.)
 Low G. C., & Manson Bahr P. H., with Walters, 585 (Hel.)
 Loyola Pereira, O., with de Mello, 303 (Lep.)
 Lück, O., 748 (Rab.)
 Lodovici, H. L., with Haas & Speer 791 (Mal.)
 di Lallo O., 146 (Der.)
 Lambrouso with Rosalacroix & Claudio, 508 (K.A.)
 Letrado, A. 18 (h.A.) 223 (Mal.)
 Lwoff, A., with Legroux, 238 (Mal.)
 Lwoff, M., 79 (Misc.)
 Lyburn, R. St. J., with Lindemann, 103 (Hel.)
-
- Mahalay E., with Plantilla, 402 (Sa.) 968 (Y & S.)
 — with Rodriguez & Tolentino (801) (Lep.)
 MacArthur W. P., 565 (Hel.)
 MacCallan, A. F., 448 902 (Oph.)
 McClamroch, J. M. & Vallotton, J. R., 51 (Fev.)
 MacClure E., 397 (Sa.)
 McCoy O. R., 85 892 (Hel.)
 McEwen, O. R., 72 (Misc.)
 Macfarlane, R. G. & Barnett, B., 396 (Sa.)
 McGeorge, M., 477 (Misc.)
 McGregor L. J., 763 (Mal.)
 McGurk, C., 184 (Misc.)
 Macht, D. I., 396 (Sa.)
 Macias y Macias, F., 476 (Misc.)
 Maciel, H., 568 (B.R.)
 Mackay I., with Kennedy 480 (Misc.)
 Mackay R., 225 (799) (Mal.)
 McHenry, A. G., 747 (Rab.)
 Mackenzie, J., 832 (Lep.)
 Mackie F. P. with Fairley 471 (Misc.)
 Mackie, T. T. Miller D. K., & Rhoads, C. P., 64 (Sp.)
 — & Poore, R. E., 63 (Sp.)
- (con't)
- McKinley E. B., 250 (B.R.)
 Mackinnon, J. E., 138 (Der.) 472 (Misc.)
 MacLean, 668 (S.S.)
 MacLean, G., 173 (S.S.)
 McMullin, J. J. A. (541) (Am.)
 McNeil, T. E., with Bradley 486 (Misc.)
 McNeil, E., with Hofoid & Bonestell, 80 (Misc.)
 — with — & Wood, 677 (S.S.)
 McRae A., 106 (Hel.)
 Macrae, C. with Troxler & Bariety 352 (Lept.)
 Madison, R. R., 875 (Pl.)
 de Magalhães, O., with Moreira, 40 915 (Fev.)
 Magoon, E. H., 288 (Mal.)
 Mahaffy A. F. with Findlay 342 (Y.F.)
 — with — Stefanopoulos & Davey 339 (Y.F.)
 — with Lloyd, 624 (Y.F.)
 Mailard, E. R. & Hazen, E. L., 47 (Fev.)
 Mainioli, M. R. with Mazza, (678) (S.S.)
 Mainzer F., 96 (Hel.)
 Majumder A. R., 540 (Am.)
 Malamos, B., 81 (Misc.)
 — with Vanck, 840 (Mal.)
 Maldonado, J. G., 941 (Lep.)
 Maldonado Sampedro, M., 118 (Hel.)
 Mallik, S. M. K., 399 (Sa.)
 — with Shortt, 387 (Sa.)
 — with Taylor 397 (Sa.)
 Mam, A. with Broc, 553 (Hel.)
 Mamou, H., with Koerliksky 352 (Lept.)
 Mamalang, C., (607) 807 815 (Lep.)
 Mandekar, A., with Carr & Barber 759 (Mal.)
 Manoelian, Y., 320 (Rab.)
 Mansell, R. A. (854) (Mal.)
 Manson, D., 625 (Misc.) 794 840 (Mal.)
 Manson Bahr P., 180 (B.R.) 709 (Dys.)
 — & Low with Walters, 585 (Hel.)
 Mannewa, S. L. A., 475 815 (Misc.)
 Maxwell, R. D., 237 (Mal.)
 Maplestone P. A., 111 (Hel.)
 — & Mokerji, A. K., 117 (Hel.)
 — & Mokerji, P. K., 575 (Hel.)
 — & Riddle, J. S., 566 (Hel.)
 Marafon, J., Perez, A. & Russell P. F., 232 (Mal.)
 Marchal G. Soulie, P. & Roy A., 352 (Lept.)
 Marchesi, F., 81 (Lept.)
 — Crainz, F. & Scapaticci, R., 18, 508 (h.A.)
 — & Scapaticci, R., 22 (h.A.)
 Marchoux, E., Chorine V. & Kochlin, D., 57 (R.F.) 307 (Lep.)
 Marcus, J. M. & Warner H. G., 902 (Oph.)
 Marani G., with Besta, 305 (Lep.)
 Marie J. & Gabriel, P., 350 (Lept.)
 Marini, C., with Decourt, Villain & Dupoux, 797 (Mal.)
 Marino S., (536) (Am.)
 Markianos, J., with Lépine, 612 (Lep.)
 Marmo A., (714) (Dys.)
 Marmorston, J., with Perla, 163 (B.R.)
 Marnie H., (799) (Mal.)
 Marque E. & Raynal, J., 473 (Misc.)
 Marschall, F., 520 (Pl.)
 Marseille A., 285 (Mal.)
 Martial, J. E., 271 (Mal.)
 Martin, D. S., 473 (Misc.)

- Martin H 494 (Misc.)
 Martin, L A with Blanc, 429 (Fer.)
 Martin, P H 458 (Misc.)
 Martin, R Chomé V & Roosend G 30
 (K A)
 —— Roosend G & Bonnefond, A 620 (Y F)
 Martin R R w th Rosen & De vd 645 (Am.)
 Martin del Campo, R 379 (So.)
 Martínez W H with Faust, 157 (Het.)
 Martini L 233 846 (Mal.)
 Martí Sanchez A 697 (R F)
 Marti I 855 (Mal.)
 Matayama, 918 (Fer.)
 Matsoch T J w th Bereternade 835 (Am.)
 Mason, M 164 662 (B R)
 Massal E 600 (Lep.)
 Massas J 334 b (Lept.) (433) 813 (Fer.)
 (847) (Am.)
 —— Bourgin P & Nguyen an Tan, 271
 (Mal.)
 Massoud F 803 (Oph.)
 Massenaga K w th W yvon 307 (Lep.)
 Matevosyan, N 31 530 (Am.)
 Matthew R J 915 (Fer.)
 —— w th Langaa, 41 (Fer.)
 Mathis C 844 (Mal.)
 —— Durieux, C & Ad ver M 340 (Y F)
 Mathus, M 240 (Mal.)
 —— w th Nicolau & Baillif, 622 (Y F)
 —— w th Rimbaud 248 (Mal.)
 Matsumoto J w th Nakamura & Kobashi,
 306 (Lep.)
 Matsumoto M 801 (Misc.)
 Matsumura T 103 (Het.)
 Mattiet C 316 (Rab.) 787 (Mal.)
 Maximo P 313 (Lep.)
 Maurice H w th Bakkev 367 676 (Pl.)
 Mauritius, 462 b 717 (Mbr.) 534 (Hel.) 763
 (Mal.)
 Maxey A F 928 (Fer.)
 Maxwell J L 833 (Lep.)
 May J M 676 (Hel.)
 May M w th Huard (847) (Am.)
 May R 855 (Mal.)
 May R M 855 (Mal.)
 Mayer M w th Nocht 883 (B R)
 Mayne, B 280 (Mal.)
 Mayne F S w th Humphreys, 509 (K A)
 Mayne, I C w th Austin, 527 528 (Am.)
 Mazza, S 678 (S S)
 —— Beurrier, C & Jaan, E Z 676 (S S)
 —— & Lova, E M 678 (S S)
 —— & Dmollet, E 211 (S S)
 —— Germinal & Danno, R 207 (S S)
 —— & Govi, L 206 (S S)
 —— & Mamoli M R 678 (S S)
 —— & Nastri de Fischer C 209 (S S)
 —— & Palamedu, B 678 (S S)
 —— & Valle F 678 (S S)
 Mededelingen an den Dienst der Volks-
 gezondheid in Nederlandsch-Indië, 363
 (Pl.) 834 (Lep.)
 Medina, C 98 (Hel.) 348, 349 (R.F.)
 Meersman, F & Lutema, J 734 646 (Mal.)
 Megiw J 32 (Fer.) 858 (Mal.)
 Malta, D R w th Covell 909 (Fer.)
 Melghen, S S & Ursuhart, M 450 (Oph.)
 de Melles, B 245 848 (Mal.)
 —— & Osborn, H S 487 (Misc.)
 Meloney H E 290 (Mal.)
 —— with Alexander 528 (Am.)
 Mellaby K, with Dako, 662 (S S)
 de Melo, A L N 746 (Rab.)
 de Melo, F & Loyola Pereira, O 226 (Pl.)
 de Melo, I P & Peixoto da Sil, L J 226 (Pl.)
 Menon, A, with Darder 411 (Fer.)
 Menon, T B 127 (Hel.)
 —— & Annadas, D R 183 (Mal.)
 —— —— & Krishnamoorthy, T K 85 (Mal.)
 Mercer H Fabre & Souage, 918 (Fer.)
 —— with Sled & Robin, 654 (S S)
 Metzner H V M 743 (Rab.)
 Metzner, R W M 175 (S S)
 Meyer J with Seroky A Seroky B &
 Weis, 144 (Der.)
 Meyer K F 433 (Fer.)
 —— & Eddie, B 871 (Pl.)
 —— with Wheeler & Herzer, 83 (R.F.)
 Meyrinhof & Habauchi, S 440 (Oph.)
 Meyer May J 578 (Hel.)
 —— & Huard, P 138 (Am.)
 —— with —— 727 (B.R.)
 —— & Vanee, M 697 (R.P.)
 Michel, C with Griffits, 244 (Y F)
 Michalewski & Hid, 769 (Mal.)
 Miguet, A S w th Molina, 179 (K A)
 Migneot-Vaiana, M w th Lebon, 206 (So.)
 Miller D G Jr with Keller Coops, Co-
 trell & Harvey 503 (Hel.)
 Miller D K with Mackie & Eason, H (S)
 Millischer (547) (Am.)
 Milne, J C 229 (Mal.)
 Milne, P S w th Wilkins, 677 (Mal.)
 Mikochevitch, S w th Bordigalli, 133 (Der.)
 Mindine, J & Rosemeyer, M L 674 (Pl.)
 Minami, W 210 (S S)
 Misra, A 290 832 (Mal.)
 Mitra, B N 376 (Cn.)
 —— w th Linton & Malhotra, 325 (Cn.)
 —— with —— & Seal, 376 (Cn.)
 Miyake S w th Takao, 806 (Lep.)
 Mochkovitz, C, 210 278, 531 (Mal.)
 Mochtar A & Sardjono, M 611 (Lep.)
 Moeller B 297 (Lep.)
 Molina, C & Miguel, A S 179 (K A)
 Molinari, P 438 (B.R.) 654 (Y F)
 —— w th Durr, 619 (R.F.)
 —— & Erber, B 350 (Lep.)
 —— & Ferroir J 251 (Lep.)
 —— with Findley, G M, 619 (Y F)
 Monden, H w th Le Charles, Regis, Poer-
 manach, J & Debret, 404 (Pl.)
 Monder H & Treillard, M 291 (Cn.)
 Montague, M & Rivaden, A 206 (Pl.)
 Monteban, P & Cardenes, M 206 (Cn.)
 de Monte, A J H w th Paunica & Coops,
 806 (Cn.)
 —— with —— & O'Flynn, 306 (Cn.)
 Monteiro, J L 438 (Fer.)
 Montel, M L R 312 (Lep.)
 —— Le Van-Pirang, Nguyen, an-Kien, Ho-
 van-Hanh, Do, an-Houa, Truong
 Qua & Nguyen-Ngoc-Khoa, 308 (Lep.)
 —— & Truong van-Qua, 122 (Pl.) 306 (Lep.)

- Montel, R. 309 bis 944 (Lep) 914 (Fev)
 — Bablet, J. Nguyen Ngoc Nhuan & Do
 van Hoanh, 944 (Lep)
 — & Le van Phung, 612 (Lep)
 — & Tran-van Hanh, 310 (Lep)
 — & Truong van Que, 700 (R.B.F.)
 Montestruc, E. 836 (Mal.)
 — & Bertrand, C. 127 557 (Hel.)
 Mookerjee S L. with Wilson 493 (Misc.)
 de Moor C. E. with Lampe, 307 945 (Lep)
 Moore F. J. with Hoyt & Flak, 323 (Rab.)
 More A. D. & Soares, J. C. 833 (Lep)
 Morales Otero P. (875) (Pl.)
 Morales Villarón, N. with Uriarte, 362, 370
 (His) (Pl.)
 — with — & Anchizar 362, 370 (Pl.)
 de Morais, C. V. 272 (Mal.)
 Marcos Z. 531 (Am.)
 Moreau, P. with Ragot, 839 (Mal.)
 — with Sict 179 (S.S.)
 Moreira, J. A. & de Magalhães, O. 40 915
 (Fev.)
 Motimoto T. 60 (Lept.)
 Morin, H. G. S. 761 (Mal.)
 — Gaschen, H. & Nguyen-Dinh Hao 838
 (Mal.)
 Morrison, W. H. 566 (Hel.)
 Mossa, E. & Salustri, E. 266 (Mal.)
 Most, H. with Goldwater Steinberg & Con
 nery 122 (Hel.)
 Mostert, H. v. R. 524 (BL.)
 Mosto, D. 539 (Am.)
 Mo Ten Sci. 506 (K.A.)
 Motta, O. C. 705 (Am.)
 Moulinard, M. 938 (Hel.)
 Mourigal, M. with Gnochvill & Heugel
 et al., 280 (Mal.)
 Mourland, W. H. with Kemp & Wright, 347
 (R.F.)
 Mountford G. 656 (S.S.)
 Muench, H. with Boyd & Stratman-Thomass,
 779 (Mal.)
 Muhlen, P. (596) (Hel.)
 Muir E. 603 608 (Lep.)
 — & Chatterji, S. N. 299 933 (Lep.)
 Mukherjee S. N. with Chopra, 841 (Mal.)
 — with Krishnan & Chopra, 79 (Allac.)
 Mukerji, A. K. with Maplestone 117 (Hel.)
 Mukerji, P. K. with Maplestone, 575 (Hel.)
 Mulder J. G. A. 74 (Misc.)
 Muller H. & Fossum, A. 156 (Misc.)
 Muller, K. L. 356 (R.B.F.)
 Muller P. 66 (Sp.)
 Mullick D. N. with Linton & Mitra 375
 (Chil.)
 Mulrennan J. A. with Boyd & Kitchen 843
 (Mal.)
 Moniz, J. & Regedanz, P. 428 (Fev.)
 — with — 427 (Fev.)
 Murashima, T. 707 (Dys.)
 Murgatroyd, F. with Yorke Glyn-Hughes,
 Lester & Ross, 659 (S.S.)
 de Muro P. 273 (Mal.)
 Murray A. J. (53) (Fev.)
 Murray I. 632 (Misc.)
 Murthi, K. N. with Pillai 65 (Sp.)
 Musgrave J. A. 548 (Hel.)
 Mustapha, A. 861 (Chil.)
 (con't)
- Naab J. P. 30 (K.A.)
 Nagahama, M. with Nagahama, 965 (I. & S.)
 Nain with Gandy 435 (Fev.)
 Nair P. K. 107 (Hal.)
 Natera Angulo, L. 19 499 (K.A.)
 Nakamura K. Kobashi, S. & Matsumoto I.
 306 (Lep.)
 Nanavati B. P. with Duggan 903 (Oph.)
 Napier L. E. 18 (K.A.)
 — & Gupta, C. R. D. 75 803 (Misc.)
 Nasuti de Fischer C. with Nasuti, 209 (S.S.)
 National Economic Council, 454 (Misc.)
 Nattan Larrier L. & Dufour J. 506 (K.A.)
 — & Grimard L. 19 21 (K.A.)
 — & Nouguib, S. 28 (K.A.)
 Nauck, E. G. & Malamos, B. 840 (Mal.)
 Naumann, H. E. 523 (BL.)
 Nauss, R. W. & Salinger, M. H. 526 (Am.)
 Navoka, J. R. 708 (Dys.)
 de Negri, U. with Sepulcri, 844 (Mal.)
 Negro Varquer E. 499 (K.A.)
 Nelson, E. C. 711 (Dys.)
 Neogi S. K. 851 (Mal.)
 Nesserlin, H. with Sicault, (777) (Mal.)
 Neumann H. with Schilling Schreck &
 Kunert, 195 684 (S.S.)
 Neveu Lemaire, M. 643 (B.R.)
 Newman M. S. with Anderson, Crowder &
 Stodola, 940 (Lep.)
 Ngo-quang Ly with Dorolle, 309 (Lep.)
 — with Huynh van Huy & Tran
 van-Tam, 612 (Lep.)
 Nguyen-Dinh Hao with Morin & Gaschen,
 838 (Mal.)
 Nguyen Ngoc Nhuan with Montel Bablet &
 Do van Hoanh 914 (Lep.)
 — with — Le van Phung, Nguyen-van
 Khai, Tran van Hanh, Do-van Hoanh &
 Truong van Que 309 (Lep.)
 Nguyen van Huong, with Ragot, Delbove &
 Ho-thieu-Higan, 354 (Lept.) 433 (Fev.)
 Nguyen van Khai, with Montel, Le-van
 Phung, Tran-van-Hanh, Do-van Hoanh,
 309 (Lep.)
 Nguyen-van-Luong with Fréville, (769)
 (Mal.)
 Nguyen-van Tan, with Bourgin (228) (Mal.)
 — with Blaauw & Boergin, 271 (Mal.)
 Nguyen-van Tung (312) (Lep.)
 Nicholls, L. 65 (Sp.)
 Nicol W. D. 278 (Mal.)
 — with James & Shute P. G., 684 (Mal.)
 Niclouan S. & Baffet, O. 322 (Rab.)
 — Mathis, M. & Baffet, O. 622 (I.F.)
 Nicoletti, F. 965 (I. & S.)
 Nicolle, C. 138 (Fev.)
 — & Lalgrat, J. 34 437 (Fev.) 619 (I.F.)
 — & Sparrow H. 44 bis 48 (Fev.)
 Nieuwenhuus, A. W. 754 (Mal.)
 Nieva, D. E. 85 (Hel.)
 Nigeria, 172 (S.S.) 337 (I.F.)
 Nigg C. 424 916 (Fev.)
 Niimi, S. 210 (S.S.)
 Nikolic, M. 325 326 (Rab.)
 Niso, F. L. 471 (Misc.) 591 (Hel.)
 Nagahama, K. & Nagahama, M. 965 (I. & S.)

- van Nieuw, R. (229) (Mal.)
 Niven, J. C. with Field, 793 (Mal.)
 Nobrega, P. with Reis, J. & Reis, A. S. 843
 (B.R.)
 Nocht, B. 613 (Lep.)
 — & Mayer, A. L. 803 (B.R.)
 — & Velasco, F. 315 (Lep.)
 Nodi, G. with Dubois, 439 (Fev.)
 Nolasco, J. O. 296, (809) (Lep.)
 Nolf, L. O. & Edney, J. M. 122 (Hel.)
 Noosten, H. H. & Visser, J. 205 (Misc.)
 Nougata, S. with Battan-Larmer 23 (K.A.)
 Nowry, M. 430 (Fev.)
 — with Blanc, 889 (R.B.F.) 921 971 (Fev.)
 — with — & Baltazard, 437 924 (Fev.)
 Novik, E. with von Jančoš, 56 (R.F.)
 Novak, M. with Schöbel, 372 (Chi.)
 de Nynno, R. 226 (Mal.)

O

- Ochoterena, I. 103 (Hel.)
 O'Connor, F. W. 528 (Am.)
 — & Huber, C. R. 592 (Hel.)
 O'Conor, M. P. 470 (Fev.)
 O'Delmonte, 23 (K.A.)
 Oesterlin, M. 603 (S.S.)
 O'Flynn, E. G. with Pauncha & de Monte
 808 (Chi.)
 Ogata, N. 441 (Fev.)
 Ohlyne, W. H. 672 (B.R.)
 Ogoro, T. 537 (Am.)
 Ohashi, K. 87 (Hel.)
 Olivaria, J. with Hull, 270 (Mal.)
 Olsen, R. 324 (Rab.)
 Otmer, D. Ottmer, J. & Audier, M. 910 (Fev.)
 Ottmer, J. with Ottmer, D. & Audier, 910
 (Fev.)
 O'Meara, F. J. 447 (Fev.)
 Orenstein, A. J. & Gordon, A. 567 (B.R.)
 Orr, H. C. 805 (Oph.)
 Osborn, H. A. 136 (Hel.)
 Osborn, H. S. with de Melton, 487 (Misc.)
 Osgood, E. E. 483 (Misc.) 556 (Mal.)
 Otten, L. 383 (Pl.)
 Otto, G. F. 562, 563 581 588 (Hel.)
 Otto, J. H. 623 (B.H.)
 Ovchinnikov, M. V. with Rybnitsky 633
 (Mal.)
 Ozeki, I. 58 (R.B.F.)

P

- Pal, H. C. 803 (Misc.)
 Pal, N. G. with Krishnan, 517 (B.H.)
 Palacio, L. D. with Earle & Arboza, 837
 (Mal.)
 Palamede, B. with Manza, 678 (S.S.)
 Palastina, 466 (Mus.) 749 (Rab.)
 Palithé, P. M. an W. 74 bus (Misc.)
 Panayotaton, A. 500 (h.A.) 637 (Am.)
 Pandit, C. G. with Wright & Sentharama Iyer
 127 (Hel.)
 Pandit, S. R. 777 (Mal.)

- Panja, D. 407 (Dwt.)
 — with Chopra & Chander, 143 (Des.)
 Panja, G. 938 (Lep.)
 Panzer, R. 672 (S.S.)
 Papantzaika, E. 17 500 (K.A.)
 Paparosco, 449 (Oph.)
 Parital, E. 561 (Pl.)
 Pardo-Castello, J. 105 (Lep.)
 Pareti, A. (799) (Mal.)
 Paris. Office International d'Hygiène Publique, 518 (Y.F.)
 Parise, V. (721) (Misc.)
 Parish, H. E. & Laake, E. W. 438 (K.C.)
 Parker, R. R. 47 440 (Fev.)
 Parreira, D. 870 (Pl.)
 Parrot, L. with Sergeant Edin, Sergeant E.
 & Catanel, 757 (Mal.)
 Parvia, P. with Scartozzi, 93 (Hel.)
 Pasca, A. M. with Tabagui, Pasca & De
 Rosario, 552 (Med.)
 Pascual, A. with Caso, 349 (R.F.)
 Pauchia, C. L. Banzoyce, E. & Li, S. 13
 (Fev.)
 — de Monte, A. J. H. & O'Flynn, E. G.
 868 (Chi.)
 — — — & Gupta, S. K. 84 (Chi.)
 Pasalacqua, R. with Uriarte & Argote, 25
 (Pl.)
 Patterson, A. R. 231 (B.R.)
 Paty, R. V. Jr. with Ima, 777 (Med.)
 Paul, M. 613 (Lep.)
 Pavlovova, I. with Takafuwa, 671 (S.S.)
 Pavlovsky, E. V. 330 bus 501 (B.R.)
 Pawan, J. L. 227 (Mal.) 242 (Med.)
 Payor, G. C. with Castle Rhodes & Lovell
 66 (Sp.)
 — with Cotay & Costa Ximby, H.
 (I. & S.)
 Peck, S. J. Crimmins, M. L. & El, L. L.
 303 (Sci.)
 — & Rosenthal, N. 364 (Sci.)
 Pecorn, G. & Escalar, G. 757 (Med.)
 Pedlow, J. T. with Rosser & Smith, F.
 (S.S.)
 Pezza, E. R. 579 (Pl.)
 Peuler & Raymond, 142 (Des.)
 Peña Chavarría, A. & Rotter, W. 301 (Pl.)
 Penfold, H. B. with Penfold, W. J. &
 Phillips, 564 (Hel.)
 Penfold, W. J. Penfold, H. B. & Peña, R.
 564 (Hel.)
 Pennantach, J. with Le Chester & Dent,
 439 527 (Fev.)
 — with —, Meeson, Berry & Dent,
 433 (Fev.)
 Poeno, G. 122 (Hel.), 533 (Am.)
 Popes, F. 379 397 398 (Sci.)
 Pereira, L. 834 (Lep.) 748 (Rab.)
 Pereira da Silva, E. 912 (Lep.)
 Pereira, P. C. R. 912 (Lep.)
 Peres, A. with Marabou & Renné, 22 (Pl.)
 Perger, G. 923 (Fev.)
 Perger, J. & Casse, J. 423 (Pl.)
 Peristera, M. with Foy & Howie, 707 (Pl.)
 Perito, D. & Martorana, J. 103 (B.R.)
 Perry, H. M. & Poole, L. J. 430 (Med.)
 Peruzzi, M. 153 (S.S.)
 Peschia, B. 444 (Fev.)
 Peter, F. V. 230 (Mal.)

- Peters B G, 947 (Hel.)
 Petersen M. C. 856 (Mal.)
 Petrov V. B. 25 (K.A.)
 — with Chodakina & Kevorkov 500 (K.A.)
 Petroschevsky G. K. & Boldyr E. D. 98
 (Hel.)
 Phoenix, E. 159 (Misc.)
 Phillips, M. with Penfold, W. J. & Penfold
 H. B. 564 (Hel.)
 Piéri, J. 28, 502 (K.A.)
 — & Sardon, 832 (Hel.)
 Pieter 608 (Lep.)
 Pietermaritzburg, 422 (Fev.)
 Pike G. R. with van Rooyen, 279 (Mal.)
 Pillai, M. J. S. & Murthi, K. N. 65 (Sp.)
 Pinkerton, H. 907 (Fev.)
 Pinto G de S., (268) (Mal.)
 Phot, M. 633 (Misc.)
 Pirumow 854 (Mal.)
 Pitruzzella, R. 504 (K.A.)
 Pittaluga, 499 (K.A.)
 Piza, J. de T. 40 (Fev.)
 Plantilla, F. C. 604 (Lep.)
 — with Denil Rodriguez & Guinto 931
 (Lep.)
 — & Mabalay E. 402 (Sp.) 996 (Y & S)
 — with Rodriguez, 604 (Lep.)
 Plazy L. & Germain, A. 41 (Fev.)
 Plotnikov N. & Zertchaninov L. 559 (Hel.)
 Plotz, H. & Giroud P. 918 bis (Fev.)
 — with — 42, 43 438 (Fev.)
 Plum, D. 115 (Hel.)
 Poggi, I. (113) (Hel.) 257 (290) (Mal.) (536)
 (Misc.)
 Ponder H. A. 77 (Misc.) 184 (S.S.)
 Pokrovskaja, J. L. 878 (Pl.)
 Pokrowski, S. W. 283 (Mal.)
 Polidori, T. 721 (Misc.)
 Politser R. with Wu Li-en-Teh, Chun & Wu,
 729 (B.R.)
 Ponder E. & Abela, J. C. 521 (Hel.)
 Pons, J. A. with Rodriguez Molina, 555
 (Hel.)
 Poole L. T. with Perry 489 (Misc.)
 — with Shortt & Stephens, 53 (53) (Fev.)
 Pooman, A. (606) (Lep.)
 Popov, P. 25 (K.A.)
 Popovici, A. with Dimitriu, 265 (Mal.)
 Porteguese Guinea, 176 (S.S.)
 Puerto-Ordez del Pino, A. & Fernández Bacardí,
 J. J. 585 (Hel.)
 Potchekhujev K. 20 (K.A.)
 Pottier R. & Van den Branden F. 201 682,
 (S.S.)
 — with — & Appelmans, 202, 682 (S.S.)
 Poultton, W. F. 174 175 (S.S.)
 Pound, R. E. with Mackie, 63 (Sp.)
 Poursoules, Y., Soulie P. & Scandarani, T.,
 508 (K.A.)
 van Praag, A. 68 (Sp.)
 Pratland, with Giraud, Berthier & Claudio, 22
 (K.A.)
 Prescriber (291) (Mal.)
 Proto, G. 698 (R.F.)
 Prica, M. 44 (Fev.)
 Priest, R. 39 (Fev.)
 Prieur M. with Launoy & Ancelot, 203
 (S.S.)
 Pruma, A. with Redaelli, 29 (K.A.)

- Proca, G. & Jonnesco, D. 744 (Rab.)
 Proceedings of the Royal Society of Medicine,
 679 (Mal.)
 Proctor F. L. with Thygeson & Richards, 450
 (Oph.)
 Prudhomme, R. O. 230 780 (Mal.) 610 945
 (Lep.)
 — with Choine, 505 (K.A.)
 Pulvertaft, 902 (Oph.)
 Purcaro, G. & Elisei, C. 529 (Am.)
 Puri, I. M. 287 853 (Mal.)

Q

- Quarterly Bulletin of the Health Organiza-
 tion, League of Nations, 499 (K.A.) 663
 (S.S.) 749 (Rab.) 888 (Pl.) 906 (Fev.)
 Quintana Otero F. 758 (Mal.)

R

- Radhakrishna Rao M. V. 484 (Misc.)
 Radima, W. 71 (Misc.)
 Radivilovský G. L. with Shevtchenko, 507
 (K.A.)
 Raevsky W. with Kalabuchov 872 (Pl.)
 Rafael Riquet, J. 573 (Hel.)
 Raffaele, G. & Lega, G. 844 (Mal.)
 Raffel, S. 205 (S.S.)
 Ragot, C. 793 (Mal.)
 — & Delbove, P. 38 39 (Fev.)
 — — — Nguyen-van-Hoang & Ho-thien-
 Ngan, 354 (Lept.) 433 (Fev.)
 — & Moreau, P. 839 (Mal.)
 Raja, K. C. K. E. 803 (Misc.)
 Ram, R. 260 (Mal.)
 Ramaga, V. T. 493 (Misc.)
 Ramos e Silva, J. 866 (I & S.)
 Ramsay G. C., Chandra, S. N. & Lamprell
 B. A. 843 (Mal.)
 Ramsay G. W. St. C. 551 (Hel.)
 Rankov M. 777 (Mal.)
 Rao G. R. with Roy 611 (Lep.)
 Rativonon, A. with Espian & Le Gac, 852
 (Hel.)
 Ranasayagam, S. with Veerasingham, 299
 (Lep.)
 Rasmussen, O. D. 904 (Oph.)
 Rattner H. 411 (Diet.)
 Ray J. C. 30 (K.A.)
 de Raymond 309 (Lep.)
 Raymond, with Peizer 142 (Der.)
 Raymond, W. D. 81 634 723 (Misc.)
 Raynal, J. 784 (784) bis (Mal.) 867 (Ch.)
 — & Caschen, H. 850 (Mal.)
 — with Marque 473 (Misc.)
 Recueil de Médecine Vétérinaire Exotique,
 750 (Rab.)
 Redaelli, P. with Ciferni, 491 (Misc.)
 — & Prima, A. 29 (K.A.)
 Reed, A. C. & Anderson, H. H. 540 (Am.)
 — & Johnstone, H. G. 63 (Sp.)
 Reenstierna, J. 614 (Lep.)
 Regondanz, P. & Muniz, J. 427 (Fev.)
 — with — 428 (Fev.)
 Rehde, R. 784 (Mal.)
 Reichenow E. (531) (Am.)

- Renier L, Scythe, C J & Pedlow J T, 670 (S.S.)
 Reis A S with Reis, J & Nobrega, 643 (B.R.)
 Reis, J & Nobrega, P with A S Reis, 643 (B.R.)
 Restano L, 429 (Fer.)
 Remmiger P, 325 (Rab.)
 — & Basily J, 316, 320, 325, 744, 745 (Rab.)
 Renacci V with Haard & Hayash-Tan-Doa, 536 (Am.)
 Repetto R, 269 (Mal.)
 Reine J I with Saunders & Human, 990 (I & S.)
 Reseiller R, 608 (R.I.)
 Renter J, 415 (B.R.)
 Revettius, 513 (B.R.)
 Rhoads, C J with Castle, Lawson & Payne, 66 (Sp.)
 — with Mackie & Miller, 64 (Sp.)
 Ribero L, 300 (Lep.) 808 (Pl.)
 Ricci, V I with Lloyd & Thoeller, 423 (V.F.)
 Rice E M (373) (Lob.) 773, 774 (Mal.)
 Rice J B with Barber, 256, 762 (Mal.)
 Richards P with Thygesson & Proctor, 450 (Oph.)
 Richardson R C, 602 (Lep.)
 Richter P, 859 (Hel.)
 Richter R with Rothenmundt, 124 (S.S.)
 Riddle J, — with V plitstone, 503 (Hel.)
 Rieuvel J, — with De la Barrera, 362 (Pl.)
 Rigdon R H with Calder, 712 (Dys.)
 Riley G E F with E C & Cook, 5 S 220 (Mal.)
 Rimbaut G & Mathieu, M, 244 (Mal.)
 Rio P, 278 (Mal.)
 Rico Hen, J — with Bustamante & Varela, 38 (Fer.)
 Rico M with Touzec, 913, 914 (Fer.)
 Ristorcelli, 709 (Mal.)
 di Risas D with de Risas, C T, 62 (B.R.)
 de Risas C T — with Johnson, 675 (S.S.)
 Ri Perez M with Boyd, 443 (Der.)
 Rivetta di Valenzogna, 755 (Mal.)
 Rivaden A — with Montaigne, 369 (Pl.)
 Roberts J I, 359 (360) (Pl.)
 — & Tonking, H D, 622 (Mal.)
 Robertson A, 188 (S.S.)
 Robertson R C, 849, 939 (Hel.)
 Robic, J with Gerard, 877 (Pl.)
 Robia, C with Lee, 779 (Mal.)
 — with — & Mercier, 636 (S.S.)
 Robia, L & Truong an Hoan, 271 (Mal.)
 Rockefeller Foundation, 185, 186, 882 (B.R.)
 Rodham, J & La ron, W, 593 (Hel.)
 — & Henry E, 471 (S.S.)
 — & Valcke G, 134 (Hel.)
 Rodriguez, J, 298, 299 (Lep.)
 — Malabay & Tolentino, (801) (Lep.)
 — & Plantilla, F C, 804 (Lep.)
 Rodriguez, J N with Dosal, Celinto & Plantilla, 831 (Lep.)
 Rodriguez Molina, R, 116, 934 (954) (Hel.)
 — & Pona, J A, 556 (Hel.)
 Rodriguez y Ramch, C with Carbocell y Salazar, 678 (Hel.)
 Roman, E, 638 (Mal.)
 Rominger E & Somakov C, 70 (Sp.)
 van Rooyen, C E & Pie, G R, 239 (Mal.)
 Rosa, A, 253 (Mal.)
 — & Valde, E S, 768 (Mal.)
 Rossetti, E A, Martha, R R & Dend, J L, 545 (Am.)
 Rosenfeld, S & Leslie, S E, 203 (Sa.)
 Rosenheim, M L with Mandel, 87 (Sa.)
 Rosenthal, J M, 120 (Der.)
 Rosenthal, J with Peck, 284 (Sa.)
 Ross, A O F with Lorke, Margret, Glynn-Hughes & Lester, 629 (S.S.)
 Ross, J E, 678 (Hel.)
 Ross, P, 20 (K.A.)
 Rothemann, M & Richter, R, 124 (S.S.)
 Rothfield, J with Treweall, 104 (Hel.)
 Rotter W, 109 (Hel.)
 — with Perla Chavaria, 284 (Hel.)
 Rosband, E, 180 (S.S.)
 — & Cobas-Belcoor, J, 653 (S.S.)
 — — & Treillard, M, 286 (Mal.)
 — & Treillard, M, 707, 874 (S.S.)
 Rosche, 771 (Mal.)
 Roselli, G with Mietta & Bonato, 13 (I.F.)
 — with — & Chirba, 20 (K.A.)
 Roslacoste, Claudio & Lissimone, 501 (L.I.)
 Rossetti, H with Sparrow, 434 (Fer.)
 Row R, 28 (K.A.)
 Roy A, with Marchal & Socha, 226 (Lep.)
 Roy A C, with Chopra, 273 (Mal.) 30 (S.S.)
 — with — & Gupta, 492 (Mal.)
 Roy A T & Rao, G R, 611 (Lep.)
 Roy D V with Schickhard, 551 (Mal.)
 Roy P K, 253 (Mal.)
 Rozenboom, L E, 294 (Mal.)
 Roswell, A J H, 373 (C.I.)
 Roswell, P P, 767 (Mal.)
 — & Baker, F E, 437 (Mal.)
 — with Marabou & Perez, 22 (Mal.)
 Rybinsky, S B & Ovchinnikov, I L, 433 (Mal.)
 Ryga, S, 849 (Hel.)
 Ryne, G A, 844 (Lep.)

- Salustri, E., with Moneti, 266 (Mal.)
 Samsonow T. 875 (Pl.)
 Samuel, J., 81 (Biac.)
 Samy M. 555 (Hel.)
 Sanchez Santiago B. with Carbonell y
 Salaras 705 (Am.)
 de Sanctis Monaldi, T. 283 (Mal.)
 Sandaragara, A. P. with Fernando 687
 (Mal.)
 Sandera, J. P. 788 (Mal.)
 Sander L. & Loumaigne, 52 (Fev.)
 Santamarina, V. with Indian 481 (Biac.)
 Sans Astola, J. 393 (Hel.)
 Sardjito, M. with Mochtar 811 (Lep.)
 Sardon, with Pieri, 952 (Hel.)
 Sarkisian, A. B. (SOS) (K.A.)
 Sarkisiane, A. B. (779) (Mal.)
 Sartory A. Sartory R. Meyer J. & Weiss
 R. 144 (Der)
 Sartory R. with Sartory A., Meyer & Weiss,
 144 (Der)
 Sasaki, T. 110 (Hel.)
 Sasuchin, D. Ioff, I. & Tallow W. (879) (Pl.)
 Sato, K. with Imai & Kanazawa, 743 (Rab.)
 Satta, E. 853 853 (Hel.)
 Sauerstein, H. with Hod 562 (Hel.)
 Saunders, G. M. Kumar, H. V. & Ratne
 J. I. 960 (I & S)
 Sauret, J. 283 772 (Mal.)
 — with Franchi, 270 (Mal.)
 — with Galliard, 242 (Mal.)
 — with Lépine 522 (Rab.) 450
 (Fev.)
 Savagnone L. 18 (K.A.)
 Savino, E. 382, 363 (Pl.)
 Savoie S. R. Castaneda, M. R. & Zinner H.
 436 (Fev.)
 — with Lewthwaite 424 911 921 922
 (Fev.)
 Sawyer W. A. 615 622 (I.F.)
 — & Whitman, L. 335 (Y.F.)
 Sayad, W. Y. Johnson, V. M. & Faust, E. C.
 896 (Hel.)
 Sayid I. A. 544 (Am.)
 Sazerc, R. & Larthe, V. 684 (S.S.)
 Scales, C. 436 (Fev.)
 Scandarani, T. with Poursane & Soulie, 503
 (K.A.)
 Scapaticci, R. with Marchesi, 22 (K.A.)
 — with — & Craine, 16 508 (K.A.)
 Scartozzi, C. & Parvis, F. 93 (Hel.)
 Schafraim, A. with Gramet & Zoutendyk,
 583 (Sc.)
 Scharrer B. 53 (R.F.)
 Scharrer, J. W. 770 771 (Mal.)
 Schartam-Hansen, H. 800 (Biac.)
 Scheepe F. L. 123 (Hel.)
 Scheidam, J. R. with Hanemann, 143 (Der)
 Schuchobalowa, N. with Schulz 597 (Hel.)
 Schubert H. with Adler & Theodor 693
 (R.F.)
 Schilling, C. (763) (Mal.)
 — with H. Schreck, H. Neumann & H.
 Kunert, 195 664 (S.S.)
 Schinzel, A. 68 (R.B.F.)
 Schlossberger H. & Grillo, J. 188 (S.S.)
 Schmidt, F. 105 (Hel.)
 Schmidt, H. 100 (Hel.)
 Schmitz, J. with Grillo, 188 (S.S.)
- Schöbl, O. & Nakada, M. 373 (Chl.)
 Schoen, R. with Levaditi, 318, 319 bis 750
 (Rab.)
 Schoening H. W. 750 (Rab.)
 Scholtens, R. T. (378) 364 (Chl.)
 Schreck, H. with Schilling, Neumann &
 Kunert, 195 664 (S.S.)
 Schufman, S. 298, 605 (Lep.)
 — with Fernandez, 311 (Lep.)
 Schulmann, W. (275) (Mal.)
 Schulz, H. H. 51 (Fev.)
 Scheitz, R. E. & Schichobalowa, N. 597 (Hel.)
 Schwesburg, F. with Gerlach, 320 748 bis
 (Rab.)
 Schwenck, J. 86 (Hel.)
 Schwetz J. 277 786 (Mal.)
 Schwetzer, 761 (Mal.)
 Scott, H. H. 157 (Mal.)
 Scott, J. A. 532 (Hel.)
 Seal, S. C. 374 (Chl.)
 — with Linton & Ultra, (376) (Chl.)
 Seaton, S. P. 517 (Bl.)
 Seckinger D. L. 701 (Am.) 780 (Mal.)
 Sédat, J. 903 (Oph.)
 — with Joyeux & Esnard, 135 (Hel.)
 Seetharama Iyer P. V. with Wright &
 Pandit, 127 (Hel.)
 Seguin, P. & Vincent, R. 693 (R.F.)
 — with — & Daupreme, M. 692 (R.F.)
 Sel, M. T. 28 (K.A.)
 Selk, H. 709 (Dys.)
 Sellinger E. 450 (Oph.)
 Sellards, A. W. & Laigret, J. 618 (I.F.)
 Seilek, A. with Hoari, 553 (Hel.)
 Sellers, W. with Cauchi & Bankali, 854 (Mal.)
 Selwyn-Clarke P. S. 618 (I.F.)
 Sen, B. with Chopra & Bhattacharya, 519
 (Bl.)
 — with — & Gupta, 793 (Mal.)
 — with — & Ganguli, 275 (Mal.)
 — with — & Sen, G. 545 (Am.)
 Sen, G. with — & Sen, B. 545 (Am.)
 Sen, S. with Knowles & Das Gupta, 700
 (I.R.F.)
 Senoret, G. 164 (B.R.)
 Sepukri, P. & de Negri, U. 844 (Mal.)
 Sequeira, J. H. 724 (Mal.)
 de Sequeira, L. A. F. 176 (S.S.)
 Sergeant, A. 694 695 696 bis (R.F.)
 — & Lavy H. 348 (R.F.)
 — & Vogt, P. (223) (Mal.)
 Sergeant, E. 243 251 (Mal.)
 Sergeant, Edna 499 (K.A.)
 — & Adler S. 499 (K.A.)
 — Sergeant, Et., Parrot, L. & Catanei, A.
 757 (Mal.)
 Sergeant, Et., 400 bis (Sc.)
 — & Catanei, A. 849 (Mal.)
 — with Sergeant Ed., Parrot & Catanei,
 757 (Mal.)
 Serra, G. 969 (I & S)
 Servajean, C. (849) (Mal.)
 Seyberlich, with Calbainic 399 (Pl.)
 — with Lo Gall & Brault, 874 (Pl.)
 Shahin, M. 34 (Fev.)
 Sharp V. A. D. 410 (Diet.)
 Sharp W. B. & Hollar E. 52 (Fev.)
 Sharper B. 53 (R.F.)
 Shattuck, G. C. 510 (K.A.)

- Shelley H. M. 329 (B.R.)
 Shevtchenko, F. I. & Radzivilovsky G. L. 507 (K.A.)
 —— with Soddy 507 (K.A.)
 Shiga, K. 609 (Lep.)
 Shimomura, H. with Sugita, 563 (Chi.)
 Shirokorov J. 284 (Mal.)
 Shore, R. E. 521 (Rab.)
 Shortt, H. E. 319 (Rab.)
 —— & Mallik, S. M. A. 337 (Sci.)
 —— Poole, L. T. & Stephens, E. D. 53 (Sci.) (Fev.)
 —— & d'Alva, H. A. H. 420 (Fev.)
 —— Sutton, J. A. & Swaminath, C. S. 17 (K.A.)
 —— & Swaminath, C. S. 16 (K.A.)
 Shrimpton, E. A. C. 601 (R.P.)
 Shute P. G. 807 (Mac.) 851 (Mal.)
 —— with James & Nicol, 634 (Mal.)
 Siegert H. & Nemeroff, H. (777) (Mal.)
 Seit, A. & Moran P. 179 (S.S.)
 —— & Robin, C. (779) (Mal.)
 —— —— & Mercier H. 636 (S.S.)
 Siddiqui, M. A. with Cheney & Abraham, 981 (I & S.)
 Sibbergh, G. (782) (Mal.)
 Sigala, R. with Lande, 577 (Hel.)
 d'Silva, H. A. H. with Shortt, 420 (Fev.)
 da Silva J. L. with Jorge & Leal, 168 (Mal.)
 Silvers, I. L. with Epstein, 919 (Fev.)
 —— with —— & Excepcioraya, 919 (Fev.)
 Simenov, A. T. V. 798 (Mal.)
 Simic, T. 830 833 (Ara.)
 Simond, E. L. (866) (F.I.)
 Simpson, G. & Anderson, A. S. 291 (Mal.)
 Simpson, I. A. 634 (Mac.)
 Singer E. 672 (S.S.)
 Sutton, J. A. 233 636, 782, 753 760 (Mal.)
 —— with Ghosh, 239 (Mal.)
 —— & Harbhagwan, 282 (Mal.)
 —— with Shortt & Swaminath, 17 (K.A.)
 —— & Vista, R. C. 233 (Mal.)
 Sitanaka J. B. 974 (Lep.)
 —— & Kodiyat, R. 934 (Lep.)
 Slot, J. A. 74 (Mac.)
 van Slype W. 113 (Hel.) 235 274 (Mal.)
 —— & Bosser C. 915 (Fev.)
 Smith, C. N. with Bishopp, 485 (Mac.)
 Smith, E. C. 342 (I.F.) 408 (Mac.)
 Smith, F. C. with Holiday & Heminge, 478 (Mac.)
 Smith, H. S. 638 (Mac.)
 Smith, R. O. A. & Helder, K. C. 26 (K.A.)
 Smithburn, K. C. with Sabin & Thomas, 302 (Lep.)
 Smither, D. W. with Dixon, 102 (Hel.)
 Smythe, C. V. with Reiner & Peplow, 670 (S.S.)
 Snell, A. M. (98) (Sp.)
 Soeljder, E. P. 126 (Hel.) 720 (Mac.)
 Snowman, J. 571 (B.R.)
 Soave, J. C. with Moes, 933 (Lep.)
 Sociedad Argentina Patologa Regional del Norte, 570 971 (B.R.)
 Soda, Y. & collaborators, 573 (Chi.)
 Soghril, 722 (Mac.)
 Sonoda, R. 347 (Mal.)
 —— & Gilbert, A. P. W. 231 (Mal.)
 —— with Walsh, 774 (Mal.)
 Soder, M. S. 929 (Fev.)
 —— with Chodkin & Kurokawa 506 (Chi.)
 —— & Shevtchenko, F. I. 507 (K.A.)
 Sokhary S. S. & Munro, H. 267 (Mal.)
 —— with —— 878 (F.I.)
 Solomon, E. with Grossman, 729 (Mal.)
 Somaliland Protectorate, 751 (Rab.)
 Somasundram, S. 234 (Mal.)
 Sonnenchein, C. 789 (Mal.)
 Soyer F. L. (816) (Y.F.)
 Sorel, 254 (Mal.) 223 (Y.F.)
 Sorley J. T. 312 (Lep.)
 Soukney V. Jonakow-Korjukow, I.
 Fawcettown, B. & Kastner, E. 87 (S.)
 Soulage, with Mercier & Fabre, 916 (Fev.)
 Soule, M. H. 306 (Lep.)
 Souhe, P. with Marchal & Roy 232 (Lep.)
 —— with Poerbeke & Saunders, 26 (K.A.)
 South African Institute for Medical Research, 82 (B.R.)
 South African Medical Journal, 175 (S.S.)
 Southern Medical Journal, 200 (Mal.)
 Southern Rhodesia, 851 (Hel.)
 Southwell, T. with Blacklock, 166 (S.S.)
 Souza-Arrejo, H. C. 612 (Lep.)
 Spaar A. E. with Hay & Ledwith, 701 (Mal.)
 Sparrow H. 45 Ia, 437 438 (Fev.)
 —— with Nicolle, 44 Ia, 48 (Fev.)
 —— & Rossel, H. 434 (Fev.)
 Spactor, R. A. 533 (Ara.)
 Spain, T. D. 409 (Dent.)
 Spandler, A. 303 (Lep.)
 Spink, W. W. 123 (Hel.)
 —— with Thoburn & Aspinwall, 123 (Fev.)
 Spindler, J. T. (935) (Hel.)
 Springer H. 617 (Y.F.)
 Sprawson, C. A. 818 (Y.F.)
 Stabler R. M. with Weisz & Arndt, 13 (Ara.)
 Stage, H. H. 807 (Mac.)
 Standing, T. with Castellani, 473 (Mac.)
 Stamna, H. S. 110 (Hel.) 410 (Dent.)
 Stanton, A. T. 18 (K.A.)
 Stark, W. 277 (Mal.)
 Statistical Bulletin Metropolitan Life Insurance Company 268 (Mal.)
 van Staaten, P. B. 65 (Sp.)
 Stefanopoulos, G. J. 619 (I.F.)
 —— with Findlay, Davy & Mandy, 26 (Y.F.)
 Steinberg, I. with Goldstein, 346 & Connery 122 (Hel.)
 Stephens, E. D. with Shortt & Poole, 51 (Fev.)
 Stephenson, D. with Hippold, 429 (Mac.)
 Stern, R. O. with Findlay 340 (Y.F.)
 Steward, L. & Berry P. 111 (Hel.) 26 (Lep.)
 Stewart, J. L. 663 (S.S.)
 Stodola, P. H. with Anderson, Connor & Newmann, 540 (Lep.)
 Stoker, W. J. with Bowes, 231 (Mal.)
 Stoen, R. V. 410 (Dent.)
 Storm, G. J. with de Langen, 231 (Mal.)
 Stott, H. 57 (Fev.)
 Stoyka, J. A. R. 462 (Mac.)
 Strachan, P. D. 293 (Lep.)

- Stratman-Thomas, W. K. with Boyd 842 (Mal.)
 — with — & Kitchen, 240 842 bis (Mal.)
 — with — & Moench 779 (Mal.)
 Strickland, C. 254 (Mal.)
 — & Roy D. N. 851 (Mal.)
 Stroescu G. 700 (R.B.F.)
 Stromquist, W. G. 837 (Mal.)
 Segino R. 377 (Chl.)
 Segio K. & Shimomura, H. 863 (Chl.)
 Semi, I. & Inoue, K. 533 (Am.)
 Seng, C. H. with Yang, 703 (Dys.)
 Svensson, R. 412 (B.R.)
 Swaminath, C. S. with Shortt, 18 (R.A.)
 — with — & Sinton, 17 (R.A.)
 Swartzweiler J. C. with Faust, 547 (Am.)
 Sweet, M. A. with Walker 301 (Lep.)
 Sweet, W. C. with Jacobs & Hendrick, 112 (Hel.)
 Swellengrebel, N. H. 221 284 (Mal.)
 — with de Buck, 241 bis 242 (Mal.)
 — with Kraan & de Buck, 239 (Mal.)
 Swezy W. W. 278 (Mal.)
 Sydenstricker V. P. & Vryonis, G. P. 226 (Mal.)
 Symes, C. B. 343 (SIS) (F) 651 (S.S.)
- T
- Tai T. Y. with Loh, 860 (Chl.)
 Tahimi, T. 848 (Hel.)
 Tajiri, I. 609 938 (Lep.)
 Takahara, K. with Hoo Adachi & Saito 627 (Misc.)
 Takasaki, J. 550 (Hel.)
 Takino, M. & Miyake, S. 608 (Lep.)
 Talbot, S. B. 534 (Hel.)
 — with Cort, 534 (Hel.)
 Talec 356 (R.B.F.)
 Tallaferrro, W. H. & Pavlinova, I. 671 (S.S.)
 Talukder M. 477 (Misc.)
 Tamura, S. 48 (Fer.)
 Tanner N. C. & Hewlett, R. F. L. 264 (Mal.)
 Tao C. S. 849 (Hel.)
 — with Komiy & Kawana, 849 *post* (Hel.)
 — Yu T. H. Chm, P. J. & Wang C. 87 (Hel.)
 Tao S. C. with Komiy & Kawana, 558 (Hel.)
 Taylor E. L. 88 105 (Hel.)
 Taylor J. & Ahuja, M. L. 375 (Chl.) 387 bis (Sn.)
 — & Gurkirpal Singh, 377 (Chl.)
 — & McRae, S. M. h. 387 (Sn.)
 Tebbutt, A. H. with Hughes & Dietheim, 914 (Fer.)
 — & Warden, D. A. 914 (Fer.)
 Telesh G. 593 (Hel.)
 Ten Bokkeli Heinink, A. 709 (Dys.)
 Teng, C. T. with Zia, 28 bis (R.A.)
 Tewari, M. 887 bis (Chl.)
 Theller H. & Augustine, D. L. (592) (Hel.)
 — — & Spink, W. W. 123 (Hel.)
 Theller M. with Lloyd & Ricci, 623 (F.)
 Theodor O. 445 (Fer.)
 — with Adler & Schieber, 683 (R.F.)
 Thomas, R. M. with Saben & Smithburn 302 (Lep.)
 Thomas W. L. & Keys, S. 778 (Mal.)
- Thornton, E. \ 358 (Pl.) 422 (Fev) 769 (Mal.) 863, 869 (Pl.)
 Thygeson P., Proctor F. I. & Richards, P. 450 (Oph.)
 Tiflow W. with Saengerin & Ioff (879) (Pl.)
 Tilson, L. 308 (Lep.)
 Tikhomirova, M. 367 (Pl.)
 — Sagorikaja, M. & Iljin, B. (368) (Pl.)
 Timbre, H. G. 759 (Mal.)
 Timpano, P. 118 (Hel.)
 — & Castorina, G. 710 (Dys.)
 Timseil, J. 593 (Hel.) 603 (Lep.)
 — & Berney, P. (301) (Lep.)
 To S. & Ko, B. 561 (Hel.)
 — & hyu, K. 548 (Am.)
 Tokura, Y. 55 (R.F.) 198 (S.S.) 490 (Misc.)
 Tolentino J. G. 297 (605) 943 (Lep.)
 — with Rodriguez & Mabalay (601) (Lep.)
 Tonking, H. D. 115 (Hel.) 724 (Misc.)
 — with Roberts, 632 (Misc.)
 Topley, W. W. C. & Wilson, G. S. 971 (B.R.)
 Torrealba, J. F. (678) (S.S.)
 Torres S. 743 (Rab.)
 — & Lima, E. de Q. 743 (Rab.)
 Totte, R. 138 (Der.)
 Touleec F. with Haas & Vauzel, 81 353 (Lept.)
 — & Riou, M. 913 914 (Fev)
 Toumanoff, C. 850 (Mal.)
 — & Hu S. M. K. 849 (Mal.)
 Traband, J. 541 (Am.)
 Tran-van-Hanh, with Montel, 310 (Lep.)
 — with — Le-van-Phung, Nguyen-van-Khai, Do-van-Hoanh, Truong-van-Que & Nguyen-ngoc-Nhan, 306 (Lep.)
 Tran-van-Tam, with Dorolle, Ngoc-Quang Ly & Huynh-Huy 612 (Lep.)
 Trawitzki, A. 124 566 (Hel.)
 — & Rothfeld, J. 104 (Hel.)
 Treillard, M. 248 bis 845 (834) bis (Mal.) 345 (F.)
 — with Monier 291 (Mal.)
 — with Roubaud, 207 674 (S.S.)
 — with — & Colas-Belcourt 238 (Mal.)
 Trenza, E. (230) (Mal.)
 Trenza, F. 229 298, 781 783 (784) (Mal.)
 Trim, E. A. 854 (Hel.)
 Trojner J., Barkley M. & Macræ, C. 352 (Lept.)
 Trowell, H. C. (339) (Am.)
 Truche, C. with Cravellier & Viala, 748 (Rab.)
 Truong-van-Hanh with Robin, 271 (Mal.)
 Truong-van-Que, 309 (Lep.)
 — with Montel, 132 (Hel.) 309 bis (Lep.) 700 (R.B.F.)
 — with — Le-van-Phung, Nguyen-van-Khai, Tran-van-Hanh, Do-van-Hoanh & Nguyen-ngoc-Nhan, 309 (Lep.)
 Tsao, S. L. with Yang, Chang & Chung, (865) (Chl.)
 Tschirkes, L. A., Litvack, J. I. & Korovitzky, L. K. 805 (Misc.)
 Tschernjak, I. with Isaboliniak & Lewrow 317 (Rab.)
 Tschernobaw W. with Faddeeva, 875 (Pl.)
 Tsurumi, M. 870 (Pl.)
 Tabangui, M. A., Basica, M., Pasco, A. M. & del Rosario, F., 592 (Hel.)

- Tumanay V M. 572 (Pl.)
 Turner E L Berberian, D A & Dennis,
 E W (564) (Hel)
 — Dennis, E W & Berberian, D A 101
 (Hel)
 Turner T B 967 (1 & S)
 — with Kumm, 961 (1 & S)

U

- Uchumera, I. 400 (Mus.)
 Udalagama L. 792 (Mal.)
 Uganda Protectorate, 174 175 645 (S.S.)
 Uhlenhuth & Zimmerman, 62 (Lept.)
 Uhry with Labbe Boulin & Ulman, 331
 (Lept.)
 Uque V. 109 526, 569 (Hel.)
 Ulman, with Labbe Boulin & Uhry 331
 (Lept.)
 Union of South Africa, 386 (Pl.) 422 (Fev.)
 760 (Mal.)
 Urnarte, L. Argerach, R & Pascualscoa, R
 361 (Pl.)
 — with Hattaglia, 361 (Pl.)
 — & Canal Feydo E J 361 (Pl.)
 — & Morales Villarón, V 362, 370 bis
 (Pl.)
 — — — & Ancheta B 362, 370 (Pl.)
 Uriach, F W with de Verteuil, 742 (Rab.)
 Urquhart, M with Meghan, 450 (Opt.)
 Uspeenkaya, M. 275 (Mal.)
 Utley K H (225) (Mal.) 538 (Hel.)
 Uyeno, H. (56) (Hel.)

V

- Valcke G. 120 (Hel.)
 — with Rodham, 134 (Hel.)
 Valente L C & Bechelli, L M. 313 (Lep.)
 Valle, F. with Maizza, (575) (S.S.)
 Valle, S. 613 (Lep.)
 Valli, E S with Rosa, 780 (Mal.)
 Vallotton, J R with McClamroch, 61 (Fev.)
 Valverde, A. with hours, 80 bis (Hel.)
 Van den Berghe, L. 336 (1 F.) 532 (Hel.)
 — with Bourgeignon & van Bogart, 606
 (S.S.)
 Van den Braeden, F. 187 (S.S.) 303 (Lep.)
 508 (K A) 632 (S.S.)
 — — & Appelmans, M. 190 (S.S.)
 — — — & Pottier R. 201, 602 (S.S.)
 — — — with Pottier 201 602 (S.S.)
 van der Schaar P J 983 (Y & S.)
 Verdú E C. 274 (Mal.)
 Varela, G. with Bustamante & Rios Neri, 36
 (Fev.)
 Vassilieva, P C. 884 bis (Chi.)
 Vassilkova, Z. 578 (Hel.)
 Vauzel, M. 607 (R F.) 913 bis (Fev.)
 — — — & Hassle, G. 474 (Mus.)
 — — — with — — & Toullée 61 353 (Lept.)
 — — — with Meyer May 607 (R F.)
 Vazquez-Colet, A. 749 (Rab.)
 van Veen, A G with Hijman, 724 (Mus.)
 Veerangham, K V & Ramaswamyam, S.
 209 (Lep.)
 Velasco, F. with Nocht, 315 (Lep.)

- Vellard, J. 812 (B R.)
 — — & Miguelito-Vazquez, M. 300 (Se.)
 de Vera, with Lora, (504) (Lep.)
 Verde M. 24 (K A.)
 Verfurth, D H. with Kuboth, 301 (Lep.)
 Verga, J. 333 (Lept.)
 de Verteuil, E. & Uriach, F W. 742 (Rab.)
 Vespoli, M. 300 (Lep.)
 Viala, C. with Gravenhorst & Trichet, 34
 (Rab.)
 Viala, J. 324 (Rab.)
 Vicars-Harris, N H. 468 (S.S.)
 Vidya Prasad, with Correll & Batty 25 (Se.)
 Vigoni, M. 270 (Mal.)
 Vilam, G. 529 (B R.)
 — — — with Decoort, Marie & Dupont, M
 (Mal.)
 — — — & Dupont, R. 782 bis (Mal.)
 Vilchez, G G & Castro, A. (511). 504 bis
 (Lep.)
 — — — — & Anderson, J V D. 548. 549
 (Lep.)
 Vinzent, R. with Segura, 603 (R.F.)
 — — — — & Daubenton, M. 603 (R.F.)
 Violle, H. & Livon, J. 744 (Rab.)
 Viroch, A. 28 (K A.)
 Vischer M. 718 (Mus.)
 Visser J. with Noosten, 805 (Mus.)
 Vittorio, V. 490 (Mus.)
 Vo Can Can, M. 548 (Hel.)
 de Vogel, W. 304 (Pl.)
 Vost P. with Sergeant, (200) (Mus.)
 Volanika, L. 299 (Mal.)
 Vollmer O. 513 (Mal.)
 Voorhoeve, H C. 787 (Mal.)
 Vryonik, G P. with Sydenstricker, 26 (Ed.)
 Vu Ngoc-Anh, 309 (Lep.)

W

- van Waardenberg, D A. 108 (Fev.) 24
 (Lep.)
 Wagner V A. 557 (Hel.)
 Wagner O. 701 (Am.)
 Wagner K G with Marcus, 303 (Opt.)
 Waite, C H. & Gorrie R. 138 (Hel.)
 Walkin, R W & Sonsta, R. 774 (Mus.)
 — — — & Walkin-Songdrager G. B. 29 48.
 880 (Mal.)
 Walkin-Songdrager G. B. with Walkin 28
 849 850 (Mal.)
 Waldhauser M. 317 (Rab.)
 Waldorp, C P. (548) (Am.)
 Walker E L & Stacey, M A. 301 (Mus.)
 Walker F & Drury, D S. 600 (Mus.)
 Walker G R. with Evans, 240 (T.S.)
 Walters, A H. under the direction of G C
 Low & P H. Mansson-Pehr 305 (Hel.)
 Wang, C. with Tsao, Yu & Chen, M. 52 (Hel.)
 Wanzen, M. 843, 856 (Mal.)
 Wanzen, W W. 123 (Hel.)
 Wardell, D A. with Tebbitt, 814 (Fev.)
 Wardle, A. 243 (Mal.)
 Wassenbergh, M. 91 (Mus.)
 Watanabe, M. 91 (Mus.)
 Watanabe, O. 308 bis, 610, 845 (Lep.)
 Watanabe, Y. 308 bis, 610, 845 (Lep.)
 Watarai, J. 555 (Hel.)
 Watt, R C. with Section, 215 (Mus.)

- Watson, A. J., 719 (Misc.)
 Watt, J. C., 956 (Hel.)
 Watson, N. E., 935 (Lep.)
 — & Masunaga, E., 307 (Lep.)
 Weinman, D., 446 (Fev)
 Weise, W., (70) (Sp.)
 Weiss, R., with Sartory A. Sartory R. &
 Meyer 144 (Der)
 Welch, T. B., (297) (Lep.)
 Wenrich, D. H. Stabler R. M. & Arnett J. H.
 329 (Am.)
 Werner H., (780) (Mal.)
 Werwath, H., (985) (Sa.)
 Westra, S. A. 33 (Fev)
 Weyer F. 237 846 (Mal.) 637 (Misc.)
 Wheeler C. M., (348) (R.F.)
 — with Herms, 347 348 (R.F.)
 — — & Meyer K. F. 35 (R.F.)
 White, P. B. 374 bis 881 (Chl.)
 White, R. S. 774 (Mal.)
 Whitheld, A., 141 (Der)
 Whittle, L. with Sawyer 335 (1 F.)
 Wickramasuriya, G. A. W. 229 (Mal.)
 Wiggleworth, V. B. with Eriechoffe &
 Dalrymple-Champneys & others, 679 (Mal.)
 Wigmore, J. B. A. & Denning, G. M. 354
 (Lept.)
 Wilerama, E. M. with Fernando, 275 (Mal.)
 Wilkinson, W., 538 (Am.)
 Williams, C. B. & Milne P. S. 637 (Misc.)
 Williams, C. L., 380 (Pl.)
 — & Dreesen, W. C. 344 345 (1 F.)
 Williams, F. E. with Kellaway 385 (Sa.)
 Williams, H. U. 904 (1 & S.)
 Williams, P. 635 (Am.)
 Williams, P. S. with Cowdry & Heimbigner
 805 (Lept.)
 Wilson, D. A. O. 707 (Dys.)
 Wilson, D. B. 765 (Mal.)
 Wilson, G. S. with Topley 871 (B.R.)
 Wilson, H. E. C. & Smookerjee S. L., 493
 (Misc.)
 Wilson, R. P., 453 (Oph.)
 Wilson, T. 290 (Mal.)
 Winckel, C. W. F. 249 (Mal.)
 Wolff, E. K. & Austin, L. D. C. 635 (Misc.)
 Wolff J. W. & Gerlach, J. H. A. 140 (Der)
 — & Kouwenhaar W. 49 421 (Fev)
 — with — 442 (Fev)
 Wood, F. D., with Kofoid & McNeil, 677
 (S.S.)
 Woodbury L. A. 98 (Hel.)
 Worden, R. D., with Hoyt, 202 (Mal.)
 Wright, H. E., with hemp & Mouraud,
 347 (R.F.)
 Wright, R. E., 903 (Oph.)
 — & Kumar Nayar K. 450 (Oph.)
 Seetharama Iyer P. V. & Pandit,
 C. G. 127 (Hel.)
- Wu C. J., with Zia, 439 927 (Fev.)
 Wu C. Y. with Wu Lien Teh, Chun &
 Pollitzer 728 (B.R.)
 Wu, K. 91 (Hel.)
 Wu Lien Teh, Chun J. W. H. Pollitzer R.
 & Wu C. Y. 726 (B.R.)
- Y
- Jacob M. 573 (Pl.)
 Yamaguti, S. (559) (Hel.)
 Yamazaki, M. 112 (Hel.)
 Yang, Y. N. & Sung C. H. 708 (Dys.)
 — Tao S. L. Chang Y. & Chung, C. Y.
 (885) (Chl.)
 Yao, K. F. with Feng, 125 (Hel.)
 Yao, H. Kanazawa, H. & Sato, H. 743
 (Rab.)
 Yen, A. C. H. 731 (Rab.)
 Yen, C. H. & Chang, T. L. 132 (Hel.)
 Yenikomahan, H. A. 369 (Pl.) (536) (Am.)
 Yered, D. 710 (Dys.)
 York W. 185 (S.S.)
 — & Margatroyd, F. with F. Glyn Hughes,
 H. M. O. Lester & A. O. F. Ross 659 (S.S.)
 Yosozato M. 531 (Am.)
 Yoshida, S. 442 (Fev.)
 Young A. G. (265) (Mal.)
 Young, M. P. with Chang & Li, 228 (Mal.)
 Yu H. 627 (Misc.)
 — with Dren, 867 (Chl.)
 Yu H. Y. 296 (Lep.)
 Yu, T. H. with Tao, Chu & Wang, 87 (Hel.)
 Yu, E. M. & Paty R. M., Jr., (777) (Mal.)
- Z
- Zanetti, V. 343 (1 F.)
 Zanettin, G. 385 (Sa.)
 Zaturjan, A. T. 530 (Am.)
 Zao F. D. 113 (Hel.)
 Zann, F. 229 (Mal.)
 Zerchamnov L. with Plotnikov 559 (Hel.)
 Zha, L. S. & Fortner C. E., 16 (R.A.)
 — with — 16 (R.A.)
 — & Teng, C. T. 28 bis (R.A.)
 Zha, S. H. 33 (Fev.)
 — & Wu C. J. 439 927 (Fev.)
 Ziemann, H. (787) (Mal.)
 Zimbo E. (777) (Mal.)
 Zimmermann, with Uhlenhuth, 62 (Lept.)
 Zimmer H. Castaneda, M. R. & Hager F. D.,
 429 (Fev.)
 — with Savoor & Castaneda, 438 (Fev.)
 Zoutendyk, A. with Gramet, 382 (Sa.)
 — with — & Schaafma, 383 (Sa.)
 Zumpt, F. 177 (S.S.) (637) (Misc.)
 Zwora, D. Joyeux, C. & Aboucaya, A., 109
 (Hel.)

- Anoebiasis**—cont'd
 treatment by—cont'd
 sperocid, 718
 stovarsol, 537, 541
 sequelae, 84
 treponal sequelae, 44
 vioform, 706
 vatren, 718
 liver injury following, 547
- Impatiens** sp. as intermediate of Schistosomes, 11
- Anemia**
 in Egypt, 148
 in estuarine, 148
 helminthic 149–151
 result of Addisonian, 132
 in blackwater fever, 523
 in *D. latum* infection, 98, 562
 haematozoal, pect, 78
 and hookworm disease, 114, 564
 in Kenya, 113
 treatment by iron, 118
 and malnutrition, 564
 megaloblastic in East Indians of British Guiana, 201
 treatment, 201
 nutritional in Louisiana children, 569
 pernicious
 and amoebiasis, 542
 and *T. bimaculatum* infestation, 569
 in S. mansoni infection, treatment, 556, 856
 tropical and bruleide, 114
 in West disease, 553
- Enterotoxines**
 of Hookworm disease and
A. duodenalis
 bruleide, infection in Bengal, 118
 in Natal, 145
 to L. t. treatment by ethyl chloride
 free lug, 117
- Gas gangrene**
 alcalin anamide as disinfectant, 579
 number of dogs, 119
 prenatal infection of dogs, 119
Aspergillus infection in Italy, (115)
- Ankylostomiasis** *in* *in* Hookworm disease
 diagnosis, 11
- Anopheles** *of*
- Afro-synoptic tables, (854)
 - Algeria, 243, 44
 - Asia synoptic tables, (854)
 - Assam T. & Estates, anthropic indices of, 843
 - France and French Colonies (book review), 184
 - Federated Malay States
 maximum duration of life in laboratory, 461
 relative infectivity for human blood of, 459
 - India
 Calcutta, 288, 851
 synoptic tables, 287, 853
 - Indo-China, food of determined by precipitin test, 850
 - Italy Poeti Plain, 844
 - Rovigo Province, 844
 - Philippines, 853, (854)
 - Rhine district, 843
 - South Africa, Cape Province, 245
 - Sumatra, 254
- Anopheles** *of*—cont'd.
- Tunis, 43
 - Uganda, 843
 - Anopheles**
 breeding, 844
 in crab holes, 838
 destruction by boiling water, 294
 influence of salinity on, 843
 places
 in Algeria, 44
 Germany Cl-contest and pH of W. Tunis, 243
 in septic tanks, 834, 835
 - control**, 757
 in Armenia, 834
 Bonday, 213
 Dutch East Indies, 724
 Ja., 221
 Netherlands, 221
 Tennessee Valley, 827
 drainage, 16, 768, 837
 fascine, 834
 grass-growing and, 771
 ineffective, 781
 solvent, 768, 774
 theory of, 770
 fish breeding, 43, 254, 454
Curvculides
 benzochlorothane, 835
 kerosene pyrethrum-coconut oil acetonium, 215
 Paris green, 783, 772, 774
 effect on rice crops, 221
 homology of, 49
 poisoning following, 225
 susceptibility for ranking, 227
 pyrethrum, 770
 pyrethrum, 770
 wheat products, 226
 meteorological conditions and, 74
 calyx, "16, 219, 679, 709
 with aeroplane waste oil at Rangoon
 Aviation Centre, 71
 coconuts, brushing method, 71
 plantations, 720
 in rice fields, 247
 screening, 762, 770
 shading, 834
 shooting, 220, 439
 species substitution, 23
 spraying, pyrethrum, 28, 255
 suggested, in Ceylon, 213, 217
 trapping, 228
 - Entom.**
 abnormalities in Italy, 844
 of Netherlands Indies species, 229
 compared with Indian species, 228
 - Hibernation** in Ningking, 454
 - Infectivity**
 duration of, with *P. falciparum*, 42
 survey in Assam Tea Gardens, 43
 - Larvae**
 camphor, (854)
 effect of light on growth, 294
 symbiosis of Gambarus, 502
 - Anopheles albimanus**, eggs of, 209
 - assimilans** eggs of, 209

isophleles bactrianus
 bionomics, 284
 infectivity of with *P. vivax*, 284
 Barber effect of light on larval growth, 286
barberi carrier in Federated Malay States, 220, 481
christyi (*Neocellia* ?) n. sp. 764
crotalis see *A. gambiensis*
cruentii susceptibility to *P. falciparum*, 843
culex fuscipes in Ceylon
 control 215
 and malaria, 679, 680
culex see *A. vexans*
fuscofusca
 in houses, 845
 South Africa, 245
 var. *immaculatus* in Madagascar, 291
 var. *lessoni* see *A. lessoni*
gambiensis breeding
 in crab holes, 858
 laboratory 844
 influence of salinity on, 845
 life cycle 240
(crotalis) and malaria in Dar-es-Salaam, 225
lycenus bionomics of in Netherlands Indies, 235
 var. *sierrensis*
 food preference of in Shanghai, 849
 host of *P. malarii* in China, 125
 and malaria in Java, 247
 in Shanghai, 235
 time of house entry in Shanghai, 235
infestus breeding habits in salt water ponds, 853
lanceiferus eggs of 289
lituratus breeding habits in salt water ponds, 853
maculatus
 biology 290
 larvae in houses, 845
 status of 246
laevigatus eggs of 289
lituratus breeding habits in salt water ponds, 853
maculatus
 biology of, in Netherlands Indies, 235
 eggs of 290
maculipennis
 density larval, in Federated Malay States 459
 eggs of, 289
maculipennis var. *splendidus* and malaria in Hong Kong, 299
maculipennis
 behaviour of as regards choice of food supply (book review), 415
 cross-breeding, experiments between races of in Holland, 241
 eggs, influence of cold on, 233, 849
 natural colour of, (290)
 infection rates in nature and in laboratory in Greece, 258
 longevity seasonal of in Holland, 242
 measurement of 237
 races 258
 England, 843
 Europe southern, 843
 Germany 257
 northern, 848
 Rhine district, 843

isophleles maculipennis—cont.
 races—cont.
 Greece 238
 Italy 806
 Netherlands 221, 241
race atropartus
 differentiation from race *mesciae*, 846
 egg characters, 244, 807
 fat and water content in winter in Holland, 238
 gland infections with quartan strain, 240
 salivary glands in semi-hibernating, 241
 sea salt, effect on larvae, 238
 variability in size, 237
race fallax sea-salt, effect on larvae, 238
race labranchiae 263, 810
 behaviour in diurnal shelters in Algeria, 244
 egg characters, 243
 shell abnormality of, 806
 maxillary index variation, 242
 sea-salt effect on larvae, 238
race mesciae
 characters in England, 843
 differentiation from race *atropartus*, 846
 egg characters, 244
 fat and water content in winter in Holland, 238
 hibernation
 behaviour 241
 in U.S.S.R. 233
 oviposition under laboratory conditions, 234
 salivary glands in hibernating, 241
 variability in size, 237
race peruviana n. sp. 239
race subalpinus n. sp. 818
race typicus
 hibernation in U.S.S.R. 233
 oviposition under laboratory conditions, 234
 rearing in water containing saprophytic algae, 637
 salivary glands, agglutination of human, animal and avian blood and puscles, 851
marshalli var. *gibbinsi* var. nov., 848
marshalli
 biology 845
 periodic domesticity in Far East, 248
plumbeus breeding places, temperature of 832
punctiferus
 development of infective larvae of *D. immitis* in, 124
 susceptibility to *P. falciparum*, 842
P. vivax 842
punctulatus eggs of, 289
quadrimaculatus
 herpetomonad of, 79
 and malaria, 842
 susceptibility to
P. falciparum, 240, 842
P. vivax 240, 842
ratti see *A. subpictus*
sackeni (*A. cinctus*) infection rates in nature and in laboratory in Greece, 258
 maxillary index variation, 242

- Anopheles stephensi*, cistern breeder in Bombay
 213
 subspecies 284 285
 breeding places in Far East, 246
 eggs of 290 550
 experimental malarial infection of, 851
Anurididae (Indians)
 biometrical of 851
 in Salt Lakes of Calcutta, 851
Aspergillus infection rates in nature and in
laboratory in Greece, 258
Ascaris eggs of 290
 subspecies:
 eggs of 290
 and malaria in Federated Malay States,
 220
 omega eggs of 290
Anopheline
 imagines, aid to identification of in Malaya
 (book review) 497
 mud-gata, permanent preparations of, (247)
Anopheline *vs* *malaria* (849)
 in Germany 843
 Ruett Plain, 844
Anthelmintic
 carbon tetrachloride 119 577 579 583
 toxicity 110 588 587
 carbon tetrachloride and chenopodium,
 583 586
 chenopodium 577 579 583
 efficiency of (137)
 tophorbaceous juice 724
 6-hydroxy-m-cresol 577 579
 hexylresorcinol 577 579
 intestinal obstruction by round worms
 following administration of,
 108
 O-phenylphenol 577 579
 antimony 577 579
 tetrachloroethylene 117 577 579
 thymol 577 579 583
Anthrax, pestilent (874)
Antivenenes see also venoms
 of *Crotalus cerastes* 384
 cobra, a treatment of haemoptysis in
 pulmonary tuberculosis, 399
 of *Acanthocheilus* 386
 of scorpions 400
 snakes
 African and Indian,ross efficacy 382 383
 heterologous treatment of *Echis carurus*
 poisoning with, 387 389
 India and Africa, a cross efficacy 382
 383
 neutralization of viper venom haemorrhage by 387 388
 specificity 388
 standardization trial by flocculation
 tests, 389
 of *Vipera ammodytes* 387
 ratitella 388
Apodemus speciosus carrying *Spirogyrus*, 60
Appendicitis
 and amoebiasis differential diagnosis, 533
 and intestinal helminths, 856, 859
 and malaria, 285 776
 and schistosomiasis, 553
Appyndicopeltis syringae, 589
Arrow poisons in Tanganyika, 634
Arteriosclerosis in Java, 155
Arthritis associated with hepato-splenomegaly
 473
 gonococcal, differential diagnosis for
 leprosy 293
Ascaris, (110)
 in Carcosa, 573
 China, 458
 Indo-China, 576
 Porto Rico, epidemiology 167
 U.S.A. Kentucky 573
 accidental diagnosis and cure, 116
 carbon-tetrachloride poisoning in, 116
 in a child, 577
 control, bore-hole latrine, 107
 diagnosis, radiology 476
 dry conservancy and, 462
 fertilized, 573
 fatal case, 463
 in pig, experimental, 574
 meningitis in, 113
 treatment:
 carbon tetrachloride, 577 579
 chenopodium, 577 579
 in pregnant pigs, 574
 6-hydroxy-m-cresol, 577 579
 benzyl-resorcinol, 577 579
 O-phenylphenol, 577 579
 antimony, 577 579
 tetrachloroethylene, 577 579
 thymol, 577 579
Ascaris
 eggs, isolation from soil, 575
 intestinal obstruction by, 108, 204
 penetrating intestinal wall, 109
 susceptibility in man, 108
Ascaris lumbricoides
 action of extracts on growth of *Ascaris*
 in vitro, 119
 eggs
 action of chemicals on, 576
 in earth worms, 106
 extra-corporeal hatching, 106
 from swine, 573
 in an encephalitis, 108
 incidence
 in Carcosa, 573
 U.S.A. Kentucky 573
 on the liver, 108
 in man and pig, experimental only, 105
 faecalistic character, at maturity 106
Ascaris tea-garden laboratory scope of 105
Asthma in Jeddah, 718
Australoarcturus spp. as intermediate of *S. leptocephalus*
 94
Bacterial invasion and nematodes, 105
Bacteriology and leprosy principles (Topley & Wilson) part II
 versus 971
Bacillus granulosis associated with ticks
 in Glasgow 320
 parasitophorous A and B antigenic x
 associated active, 321
 typhus, agglutination by immunized serum of
 O. agglutinans 320
Balanistes egyptiacus, schistosome endobiont of
 mangrove, schistosome endobiont of
Balanistes see *Dysdercus* balanites

- Salantidium* (a)
cross-infection experiments, 711
cultivation, 711
maintenance in laboratory rats, 711
- Salantidium colis*
experimental studies, 712
purification, 712
- leprosy, possible transmission of leprosy by 839
- Bartonella*, revealed by splenectomy 446
- Bartonella bacilliformis* in verruga peruviana 144
- semen infection, haemoglobinuria in splenectomized rats, 520
- rat (Rattus sp.) as vector of spirochaete, 349
- vampire, role of in transmission of rabies, 742
- ather's itch, 335
- ejd, hyperkeratoses and depigmentation in, 966
- endemic fever 49
- eribari see also DEFICIENCY DISEASES
- atrophic
in Celebes, 403
incidence sex differences in, 405
complicating surgical operations, 159
- infantile in China, treatment, 404
- prevalence in China, 455
- treatment, rice polishings, 402
- eritella in the Philippines, 104
- eritella stoma infection
in India, 506
- Mauritius, human, 105 717
- escherich Boeck's disease, relation to leprosy 837
- Uvaria see Schistosoma, schistosomiasis
- trds, diseases of treatment on (book review) 643
- LACKWATER FEVER and haemoglobinuria, 511-525
- in Africa, in native children, 513 514
China, 517
Greece, 511
Nigeria, in native infant, 514
West Africa, 514
- aetiology 517
- anaemia, treatment Hepatrat ad in fusionem intravenously 524
- bacteruria associated with, 514
- blood, bilirubin level, experiments on us haemolyzed rabbit serum, 512
- haemoglobinuria
following eating of beans (*Faba vulgaris*) 511
- malaria, 511
- quinine, 511 519
- Well's disease, 511
- in monkeys, cholesterol changes 521
- paroxysmal, produced by cooling, 519
- quinine and, 517
- in splenectomized rats suffering from Bartonella infection, 520
- immunity of native children, 513
- and malaria, 516 518
- quinine
estimation of, in urine, 513
in relation to 512 518 525
susceptibility of native children after prophylaxis with, 513
- quinine hydrochloride resistance of rabbit red cells, 521
- treatment, 5-5
- stevin, 519 523 524

- Blackwater Fever—cont'd
treatment—cont'd
atebrin and plasmoquine, 513 519
calorose intravenously 523
campolon, 523 524
intramuscularly 523
chialdin, 518
glucose, inhibitory effect on quinine haemolysis, 518
- insulin intravenously 523
- liver extract, comparative value of intramuscular and intra venous injections, 523
- quinine 518
quinine and plasmoquine 519
strophantidin intravenously 523
urotopane 524
- Blausordia genus, synonymy 7
spp as intermediaries of Schistosoma 7 8 10
- Blastocystis and dysentery 713
- Blastodendron schwartzii n. sp. 144
- Blastomyces
in Philadelphia, 133
treatment by potassium iodide, 133
Porto Rico 138
Uruguay 138
- complement-fixation, 473
- from *C. psittaci* 472
- fungus from Liberia, 138
- Elephantiasis in a child, 808
- Blindness in leprosy prevention of 613
- Blood
Arzob coast
in Chinese 804
in rural inhabitants of Alabama, 78
- in cholera patients, 373 800
- corpuscles agglutination of by salivary glands of *A. maculipennis* 831
- effect of climatic conditions on, 801
- haemoglobin
content, 478
in Indians, 75
values in normal adults, 800
- leucocyte count
in Bengali women, 77 479
normal range over extended period, 479
- of native newborn infants, 481
- haemoglobin variation of 482
- leucocytic variation of, 482
- normal standards
in Bengal town population, 75
- in Bengali women, 77 479
- in healthy subjects, 483
- range of variations in 477 800
- in high veldt at Johannesburg, 78
- in newborn infants, 481
- in tea garden coolie populations, 75 800
- picture
differences in Europeans and natives in Batavia, 71
- coloured persons in Alabama, 77
- In *Trichuris* infections, 588, 589
- in worm-free children in Louisiana, 588
- polymyelocytic count
in China 803
- Iraq 480
- red cell measurements in Indiana, 803
- sedimentation rate and volume of technique 479

- Delirium tremens*, neurological resemblance of pellagra to, 410
- DENGUE AND SANDFLY FEVER.** 51-53
446-447 823-830
- Dengue**
- in China, 455
 - Florida, 929
 - Italian Somaliland, Otręgiuba, 49
 - Jeddah, 718
 - U.S.A.
 - Gulf Coast, Texas, 62
 - Miami epidemic, 1934, 51
 - fever simulating
 - in California, 448
 - paratyphoid A (53)
 - immunity in, 62
 - symptom abdominal pain, 52
 - temperature charts, 447
 - and yellow fever, 52
- Dental areas in So. &, 493
- Dermatocystis ciferri* and Rocky Mountain fever, 440
- Dermatophytes* *z. zelkovi* gall wasp infection in man in Australia, 145
- Dermatitis**
- in Papua, 18
 - from "sterpular" (*Euproctis chrysorrhoea*), 498
 - exanthem, disease resembling in U.S.A., 491
 - H. pomaceum*, macromelle, 723
 - pruritis in Kenya, 774
 - veterinary, 146
 - vesicular in Toulouk, 489
- ERMATOLOGY TROPICAL** 123-147 *see also under names of diseases* 123
- Actinomycetoma*
- Dermatophytes, culture of, 143
- Dermatoses influence of climate on in Australia, 147
- Egypt, 147
- Dermodes pulicaria*, bionomics of, 74
- Dendrolypis* *sp.* *var.*, susceptibility to endemic typhus fever, 918
- Diphtheria in China, 455
- Palestine, 468
- Diphyllobothrium* *cordiger* plerocercoids, infectivity of for man, 95
- metacecrid plerocercoids, regeneration of, 95
- relation to *Sporangium proliferum*, 96
- Iceland
- in U.S.S.R.
 - fish parasitised, 95
 - spread, 98
 - infestation
 - anaemia in, 98, 582
 - in Filipino child, 637
- Dirofilaria repens*
- development in *A. punctipennis*, 124
 - entry into lymphatic from blood, 593
 - filtration of embryos by lymph nodes, 329
 - periodicity of embryos, 132, 133
 - reversal, attempted, 395
- Diseases, Geography of [McNamee] (book review)** 250
- Diseases**
- of birds, treatise on (book review), 643
 - cosmopolitan, variation of, in tropical zone, 454
- Diseases—cont.
- parasitic, medical treatment (book review) 227
 - transmissible, in French Colonies, 49
 - transmission, rôle of ticks in, 837
 - tropical, Manson &, 10th edit. (book review) 644
- Djenkol bean poisoning**, 724
- Dog**
- bite, spirochaetal jaundice follows, 26
 - Enterobius Levistica* in, 321, 791, 794
- Dodson body** of *Gracilisoma capense* fl
- Dracontiasis**
- in India, seed for investigation, 294
 - supposition of knee in, 464
- Dracunculus medinensis* in human patient, 297
- Dropsey* *epidemic* *see also DISEASES*
- in India
 - Bengal, 144
 - Calcutta, 405
 - Parma, 406
 - cutaneous manifestations in, 144-145, 407
 - glaucoma in, 904
 - haematology, 406
 - histological appearance, 407
 - nodular erupções, 407
 - ocular complications of, 451, 455
 - pathology of, 406
 - and pregnancy, 406
 - symptoms, burning feet, 405
 - treatment, 406
- Dystentria**, differential diagnosis, 709
- DYSENTERY** 529-547 701-714
- Dysentery amoebic** *see AMOEBAESES*
- Dysentery bacillary** 707-718
- in China, 455, 708
 - Fiji, 708
 - Hari, 457
 - Holland, 709
 - Indian troops, 707
 - Japan, 707
 - in children, 709
 - earthen, 708
 - and ekin in Japanese children, 709
 - treatment, 709
- Dysentery balantidial** 710-712
- in Sicily, 710
 - children, 710
 - histopathology, 711
 - treatment, 710
 - carcinoma, 710
- Dysentery epidemic** ("Colera") at Balk., 714
- Dysentery glandular** 712-714
- biliary, 712
 - in children in Jeddah, 713
 - treatment, 712
 - pyrexia, 713
- Dysentery mixed and undulant**, Moscow and protocols in published, 713
- Echinococcus foemoralis* infection, 682
- treatment
 - ascorbate, 682
 - carbon tetrachloride, 682
 - strichene, 682
- Echinococcus* *see also Hydatid disease*

- Echinococcus granulosus* immunity artificial, in dog, 101 (584)
 Education, medical, of natives 526-533
Eimeria oocysta, effect of anaerobiosis on development, 491
Elixir, resemblance to dysentery 709
 "El pajar" 148
Elephantiasis *see* Filarial lymphangitis
Emergency, manual of, medical, surgical and obstetric, pathology, diagnosis and treatment (book review) 571
 acetone effect on activity of adrenal and thyroid glands, 492
 Impyema caused by *Ascaris lumbricoides* 109
Inmphalitis
 experimental, in monkeys inoculated with yellow fever virus 624
 meningo-
 following yellow fever serum vaccination, 619 (620)
 trypanosomal, 658
 in Senegalese soldier 179
Intraepithelial cysts following yellow fever vaccination, 621
Inudermophyton spp. 140
Inudinaria nana *see* Macrophage parasite, 60
 phagocytosis 532
Inutimorbus colis in association with *Blastocystis* 713
duper
 differentiation from *E. diversa* 531
 experimental infection of cats and dogs 533
 morphological differentiation from *E. histricis*, 533
 re-infection experiments in dog, 534
 differentiation from *E. ducreyi* 531
Autophytas *see also under AMOEBIASIS*
 in New York citizens, 528
 Philadelphia students, 529
 Modena, in Sardinians and Sicilians, 529
 cultivation
 human serum preferable to horse serum, 531
 loss of virulence, 532
 use of sodium citrate solution, 531
cysts
 concentration of, in faeces, 533
 effect of chlorinated lime on, 532
 in dogs, 531 701 "04
 experimental infection of cats and dogs, 531
 infection in kittens, increased severity with addition of bacteria, 533
 life history 528
 morphological differentiation from *E. ducreyi* 533
Intercal fevers
 diagnosis agglutination tests, criteria for 627
 bookworm disease following, 535
 vaccination, agglutination response research, 466
Introbiosis, development of, effect on treatment, 122
Enterobius vermicularis biology of, 121
 infection, in Illinois, in mental patients, 121
Eosinophilia
 conjunctival in Egyptians, 633
 of undetermined origin, 631
Ephydriaceae coccoides revealed by spleen test 448
 Epidemic diphtheria *see* Diphtheria epidemic
Epidermophytois
 in Bengal, 146
 Budapest, 143
 Germany 142
 Porto Rico 143
 treatment, 141 142
Epilepsy
 and cystercerosis 103 503
 due to *S. japonicum* infection, 496
 treatment
 antiepileptic vaccine 308
 cobra venom, 396
Epileptiform convulsions due to schistosomiasis, 93
Erizococcus europaeus infection with *S. haemolyticum* 9
Erythroedema polycæstis *see* Sebaceous Follicle disease
Erysipelas *see* Leishmaniasis, mucocutaneous
Euphorbiaceae poisoning, 723
 differential to man and animals, 724
Euprocis chrysostoma, dermatitis from, 499
 Eye unusual blood vessels of, as symptom of malaria, 713
Eye diseases *see also OPHTHALMOLOGY*
 TROPICAL and under names of diseases of eyes
 in Egypt, 452, 453
Faecalis Aspergillus
 anatomy of 88
 disease
 diagnosis by duodenal sound, 88
 treatment
 carbon tetrachloride, 80
 emetine, 88
 nervous complications, 80
Lymnaea philippinensis as intermediary of, 659
Fascioloplasmodium
 in China, 433
 Shanghai, investigations 455
Fava vulgaris and haemoglobinuria, 511
Favus in Algeria, 141
Federated Malay States
 annual reports of
 Institute for Medical Research, 1933
 (book review) 880
 Malaria Advisory Board, 1935 834
Fever, endemic, on coast of Oltregreba, 49
 "Fever rouge" congoilese" and yellow fever protection tests, 333
Fiji, Central Medical School at Suva, 828
Filaria
 bancrofti (*Wuchereria bancrofti*)
 in human eye 127
 infection (?) in Italy 128
 microfilariae
 in abdominal cyst, 503
 action of drugs on, 594
 entry into body cavity of mosquitoes, 584

- cockworm disease—cont'd
 control
 campaign in Spain, 116
 in Turkey 116
 suggested methods in U.S.A. 580-581
 in dogs, prenatal infection, 119
 coxiophilia m., 563
 familial, 560
 following enteric fever 563
 haematology 113, 114, 115
 red corpuscles sedimentation and eosino-
 philia in 116
 in Indian season 583
 meningitis m., 113
 pathology 113
 treatment
 blood transfusion 886
 carbon tetrachloride 114, 118, 583
 carbon tetrachloride and chesopodium,
 583, 589
 chesopodium, 118, 583
 in castor oil 583
 chloroform-castor oil, 114, 118
 Naestocida habs in castor oil, 583
 nematol, 580
 parasitol " 580
 tetrachloroethylene 117
 passage of worms after ex tent of cure
 117
 thymol, 580, 583
Hornemannia compacta sp.
 causing blasticomycosis in Porto Rico, 136
 relationship with *H. preferens* 473
 with *Pheleophora verrucosa*, 473
 further relationship with *H. compacta*,
 473
 with *Pheleophora verrucosa*, 473
 Housing
 relation to malaria, 762
 tropical
 bug-proof 636
 models at Li erpool 638
Hydrococcus leptocephalus
 rôle in spread of Rocky Mountain fever
 410
 and São Paulo typhus, 424
 Hydatid
 cysts
 in Iceland, 101
 in jaw 101
 of liver
 in Uruguay 564
 intrabiliary rupture 563
 of lung, 101
 of spleen (book review) 514
 of thyroid, 664
 diseases
 in New Zealand, research department,
 100
 Palestine 100
 advances in knowledge of 100
 Hydatida, rôle of domestic birds in development
 of 583
 Hydrococcid and filariasis, 563
 in Egypt, 127
 Hygiene
 in Italian East Africa, 496
 elementary notes on, for compound officials
 (book review) 567

- Hygiene—cont'd
 pictures, African (Loepman & Westermarck),
 167
Hyponotis diastema, incidence in Kentucky
 U.S.A. 573
 hysteria
 autoinfection, internal, in white rats, 50
 life history of 50
 iasias
 incidence in Kentucky, U.S.A., 53
 infestation in Southern U.S.A., 52, 53
Hypoderis elutus (Pallas) as intermediate of
C. shermani, 539
 Illnesses associated, stability to *I. rufipes*, 61
 infarction
 differentiation from *I. rufipes*, 61
 polysing, 634
 where differentiation from *I. rufipes*, 61
 Immunology and bacteriology principles of
 [Topley & Wilson] (ed.)
 review 571
 Inca, in the Andes, 489
 Infant mortality in Mexico, 487
 Liberia, 438
 Influenza
 in Peru, 493
 Weil's disease simulating, 293
 Insecticides
 for aircraft, 244, 245
 petroleum, standardization of, 484
 pyrethrum, 20, 253
 for oil, standardization of, 484
 Insects
 control, mechanically worked out, 63
 population densities, biological factors, 61
Isospora infection in man in Aragua, 13
 Cuba, 833
 Jacobson dermatus in treatment of infected
 prostitutes, 718
 Jamaica, Bacteriological and Pathological
 Laboratory Report 1951, 15
 Japanese river fever see under *Yellow fever*
Jatropha curcas, poisoning by 81
 Jaundice, Florida, in *Bullock County* in about 19
 yellow fever 308, 327
 Jaundice, infections, see Weil's disease
 Jam-Jalan, 721
 Juxta-articular nodes
 in Dutch East Indies, 984
 Japan, 986
 Porto Rico, 984
 lesion simulating, following injection of
 943
 Kabara, 556
 Kalindio-Fondo see haptures
 Kahn test in leprosy 303, 304, 511
 KALA AZAR, 16-31, 498-510 see *Lishmaniasis*
 Kapturo, 787
Katzewia sp. as intermediary of *Schistosoma*
 1, 6, 8
 scolecodont, synonymy? 7
 Keratikle in Papua, 748
 Keratocone plantar ulceration in Dutch East
 146
 Ketogelsis in Beckenhausen, 176
 Koro, an anxiety neurosis in South China? 7
 Koya disease see Yaws

washout 410
and pellagra, differential diagnosis, 734
enz in Philippines, 739
reductus agoyeyengyeng 402
sectoris
effect of bite in man, 401
life history 401
thrombi
in ascitic fluid 303
bile duct cells in hamster 506
cancerous cells, 506
cultivation
blood and skimmed milk medium, 501
N.N.N. medium and its modifications, 501
Möller's solid medium, 506
development in *Phlebotomus argentipes*
22, 27
differential diagnosis, 506
in nasal and oral secretions, 16, 17, 28
Uromyces brasiliensis, anomalous forms, 502
structural variation similar to *L. tropica*
502
downers
biological characters of, 501
cultivation in presence of bacteria 28
filtrability experiments, 28
in nasal secretion in Indian kala azar 16
tropism in different animals, 28
tropics
cultivation in haemoglobin-saline solution,
survival time, 28
development in *Phlebotomus argentipes* 17
filtrability experiments, 28
structural variation similar to *L. brasiliensis* 502
humans
American 365 macro-cutaneous
canine
in Algiers, 20
Azerbaijan (Turkestan) 20
Azerbaijan, 25
Beirut, 508
China, 16
Egypt 18
Greece, 508
 Messenia, 500
Italy Rome seasonal variations, 18, 508
Tashkent breeding kennels, 507
Toulouse, autochthonous case 507
cutaneous, causative agent 507
diagnosis, 20
Rickettsberg reaction (adhesion test) 23
serological, 22
formol-gel and formal-stibosan tests
compared, 24
serum reaction experiments, 509
treatment, richa (unsuccessful) 31
visceral causative agent, 507
cutaneous
in equines, 27
 treatment with berberine sulphate 27
equine 27
kala azar
 in Algeria, Northern, 500
 Azerbaijan, 25
 Brazil autochthonous case 500
 China, 454, 455, 503
 in European, 25

Leishmaniasis—cont'd
kala azar—cont'd
in Crete, 17
Greece 18
 Messenia, in children, 500
India, 16, 26, 27
Italy 18, 502
 Lucania Matera Province, 18
 Puglie Department in man of
 65 years, 502
 Rome 502
Sardinia, in association with
 malaria, 26
Sicily, 18
Manchukuo, 506
Mediterranean regions, 18, 500
Morocco 18
Peloponnesian village 549
Portugal, 18
 in an adult 19
Spain, 19, 499
Tadzhikistan 23
Tashkent, 500
Tunis 18
in adults, compared with infantile 25
agranulocytosis in, 36, 503
blood changes in, 26
variations in serum protein, 503
Chinese, study of 503
chronic, 26, 502
clastomocyte cells and infection of N.E.S.,
29
dermal conditions, 26
diagnosis
blood film examination, (505)
Brahmachari test, 22
Chopra's area stibamine test, 22, 503
confirmed by skin smear, 503
feeding *Phlebotomus argentipes* on der
 mal lesions, 27
formol-gel test, 22, 24
 non-specific reaction 22
serological tests, 499
aldehyde test, 503
complement fixation, 21
formol-neostibosan test, 22, 24, 503
Henry's reaction, 504
lactic acid test 24
peptone of iron, 24, 504, 505
stibores test, 503
salicinol, 23, 505
skin scrapings, 21
dog as reservoir 500
epidemiology 499
histopathology in children 29
infantile
 in Greece 500
 Spain, 499
compared with adult, 25
diagnosis, 24, 499
histopathology of 29
recovery spontaneous, 502
treatment, neostibosan, 503
leishmanoid, dermal observations in India,
 26, 27
liver function, 29
and malaria, associated, 26
reticuloendothelial system in, 29

- Leyomyo—cont'd
 treatment—cont'd
 chalmoogrates—cont'd.
 moogrol, 831
 iodized, 813
Crotalus *usa* *venom* as analgesic, 314 598
 electrical of contractures 294
cobra *intra* *coconi* 310 312
 fluorescein, 293 311 312, 611
intra *coconi* 310
fluorescein-uranin, 311
Friedmann's bacillus, 294
fuscum *intra* *coconi* 310
 influence of various physical factors, 943
 magnesium hypophosphate 310
 mercurochrome *intra* *coconi* 294
 methylene blue 294 309 310, 311 31-
 313 598, 61 613 644 948
 ill-effects of 314
intra *coconi* 313
 oral 613
methylenes blue and *chalmoogra*, 611
methylenes blue and *cobra* 310 612
 mixed 944
 neutral red, 309 311
cerase acid, 943
 phthalic acid salts, 844
 prussic 313
 rattlesnake anti-venom 314 598
 resorcin 311
 serum, 614
 subenyl 294
 sulfonate 315
 trypsin bals 311 613
 vitamins A and B 614
Tuberculosis
 in *Iceland* Islands, 603
 Southern Rhodesia, 297
 caseous *vesicles* of nerves, 608
 changes in 294
 classic, 603
 finding of bacilli in lesions, 603
 neural bacilli, 603
 and tuberculous chemotherapy 614
Leptomonads bacteria-free cultures of 429
Leptoospira *in akromioschlerus* infection see
Weil disease
LEPTOSPIROSIS, 58-67 350-353 *see also* *Weil's disease*
Leucoderma discolor differential from leprotic
lesions, 938
Liberia medical work of 436
Liberians medical 1 *safe* non-for *Barnard*
 (book review) 644
Lice
 head population studies, 637
 rearing of 604
Liposarcoma in lepers 30 940
Liposarcoma *bacillus* and *No P-10* *P-10* *trypsin*, 424
Liver
 abscesses (book review) 777 *see also under*
AMOEBIASIS
 causes of 536
 non-anerobic 538
 cancer of and *leishmaniasis*, 559
 changes following administration of carbon
 tetrachloride, 586
 cirrhosis of, and *schistosomiasis*, 934
Liver—cont'd.
 histopathology of, in *leprosy* 52
 cirrhosis, 484
Loi loi
 embryo, longevity of, 134
 infection, 126
 introduced into Morocco, 583
 longevity of, 134
Lopap
 as analgesic, 633
 toxicity of, 633
Lepus erythromelas in leper, (201)
Lycodes philippinus, bionomics of, 59
 as intermediary of *F. lepturus* (332)
Lymphadenoma in Nigerian native, 49
Lymphangitis, tropical (non-tropical), 23 *see*
Polynesian lymphangitis
Lymphostatic *eruption*, 473
Madura foot
 in Italian Somaliland, 721
 U.S.S.R., 133
 Yugoslavia, 139
MALARIA, 13-19 253-291 673-694, 72-73
 824-856, *see also* *Asymptomatic*
Plasmodium
 in African natives, 220
 Algeria, 223
 Ancient Gt., 229
 Armenia, 834
 atypical, 229
 Bechuanaland, 763
 Belgian Congo, 724, 726
 Bordeaux, 761
 Ceylon, epidemic of 1874-81, 23
 214, 218, 220, 222, 224, 226
 267 (782)
 contributing factors, 27-30
 China, 223, 424, 433, 436, F
 in soldiers, 434
 Corsica, 42, 777
 Dutch East Indies, 227, 702
 Java, 47
 spleen rates, 261
 Federated Malay States, 22, 42, 43
 incidence of cholera in, 22
France
 Rochefort Aviation Corp., 71
 St. Nazaire District, 222
 256
 French Colonies, 708
 Germany, 761, 800
 salinity of water in relation to, 8
 Geneva, 438, 739, 762, 772
 Haiti, 487
 Holland, 221
 Hong Kong, 229
 Burma, work of, 420
India
 Assam, 773
 Bengal villages, 739
 Bombay, 213
 Calcutta, 226
 cost of, 782
 Himalayas, 254
 man-made, 209, 220, 222
 relation of food supply to
 population to, 73
 Sind, (209)

Sabah—cont.
 in Indo-China, (228) 271 836
 Borneo, (769)
 Hart Tonking garrisons, 254
 Iraq 762
 Italian East Africa, 257 (782)
 Italy 223 257 757
 Bassa Ferrarese, 786
 influence of climate on, 253
 Sardinia, in association with kala
 azar 28
 Jeddah, 718
 Kenya, 234
 hyperendemic in native reserve 262
 prophylaxis, 465
 Liberia, 450
 Malaya, 770 771 790 834
 Martinique 836
 Mauritius, 763
 Natal, 769
 Palestine, 763
 Panama 835
 Papua, 715 839
 Philippines, 292, 787
 Porto Rico 837
 Shanghai, 254
 Singapore, 247
 South Borneo, 718
 Spain, 269
 spread from inoculated asylum
 patients, 238
 Zamora, 758
 Sumatra, 784
 Tanganyika, 786
 in Bantu children, 765
 Dar-es-Salam, 225
 Tataboouse (Tanz.) 769
 U.S.A., 262, 838
 Georgia 791
 Ohio 267
 Southern States, 281
 Tennessee Valley 837
 Zululand, 769
 Advisory Board of Federated Malay States
 annual report, 1935 834
 appendicitis and, 263 776
 avian, 277
 chemotherapy 785
 experimental infection with known num-
 bers of *P. falciparum* 237
 plasmodia, classification, 237
Plasmodium hexamerum n. sp. 277
 susceptibility of races of Culex to in-
 fection 237
 treatment, (278)
 atebeta, 238
 carbamone, 279
 evaluation of drugs, 278
 merozochrome, 278
 plasmocyste, 238
 toform, 279
 bibliography of 253
 and blackwater fever 516 518
 blood in
 changes, 238
 reticulocytes, staining of 779
 cerebral, 229 (783) 687 784
 bronchitis, capillary and, (265)
 plague simulating, 389

Malaria—cont.
 chemotherapy 857
 Commission of League of Nations, Third
 General Report, criticism of
 888
 complications, mental disturbance 776 792
 congenital, 225 229 284 783
 in Indo-China, 228
 control, (284) see also prophylaxis
 drainage ditch construction in Tennessee
 258
 quarantine imposed in U.S.A. 262
 diagnosis
 blood examination
 brilliant cresyl blue vital staining 228
 preservation in tropics of smears
 stained by Romanowsky stain,
 227
 Chopra's reaction, 503
 effect of quinine 505
 Henry's reaction, 229 268 267 268 504
 775 780 784
 antigenic properties of haemoglobin, 230
 of melanin, 230
 chemical factors, 782
 congenital malaria and, 783
 euglobulin in, 783
 flocculation, 780 781
 and "surfoculation," 230 268
 melanin (230)
 artificial (SI A) 782
 preparation of 782
 substitutes for 230
 microscopical examination of blood (book
 review) 329
 endemic indices 757
 engineering works and 260
 entomology in relation to (lecture) 234
 epidemic in Aurora, Ohio, 262
 cyclical periodicity in Ceylon, 632, 633
 gangrene of toes in, 264
 haemoglobinuria following 511
 haemorrhagic pleurisy and, (777)
 haemozoin, malanal 239
 antigenic properties 239
 Henry's reaction see Malaria, diagnosis
 in high altitudes 836
 housing and, 782
 immunity 281 282, 735 786
 acquired
 to *P. falciparum* 842
 relation to treatment of primary
 attack, 837
 experimental, 758
 studies, 841
 induced, 834
 in infants, 292
 inoculated see therapeutic malaria
 Investigation Station in Madras 1910-1933
 (book review) 809
 and kala azar associated, 38
 Kafur or Kafundo-finde, 267
 liver function in 229
 man-made 260 268 760 784
 mental symptoms in, 776 792
 meteorological factors as affecting 253 260
 in monkeys, 840
 antimalarial drugs and, 840
 blood changes, 238

- Mosquitoes—cont.
trapping
 electric automatic device, 488
 in Florida, 487
 in Philippines, 487
Mozzies, fever of North Queensland, 41
Musca domestica, colour preferences, 637
Musum specimens in tropics, preservation of, 635
Myarreye see Lupata
Mycteria
 in Italian Somaliland, 721
 U.S.S.R., 138
 Yugoslavia, 139
Mycobacter *var. l. prae* *n.* also Leprosy
cellular reaction to, 608
 to waves from 302
cultivation of, 301
in cutaneous lesions of leprosy reaction, 607
intracerebral infection with, 809
in leprosy, 603
leprosy composition of, 940
leprosy isolated from, 940
method of staining, (807)
in nasal mucus, 808
periorbitism of, 808
in tissue sections, 608
Mycobacter *var. leprae marinum* see also Leprosy
 in rats
 alt. stage of, 801, 810
morphology of, 301
Mycobacter *var. tuberculosis*
cultivation from macroscopically negative
 spots, experiments, 626
lipid heterogeneity of, 940
method of staining, (806)
Myiology medical. Parasitic diseases of men
and other mammals (book
re rev.) 570
Myiasis helminthia 951
Myiasis
 in animals, domestic, from *Calliphoridae*
 app. 488
 due to *Phaonia* *a. magna* (see 476)
 intestinal
 from *C. fumosa*, a chlorophyte, 487
 in pregnant women, 808
 and sepsis, (318)
Myopia in China, 904
Myotis, tropical and *L. stenomorphus* 697
Mystery disease of Calcutta, 721
Naurotis eye see *Pandanus crebripunctatus*
Native Medical Practitioner in the Pacific
 (special article) 626-633
Nematodes
 bacterial in man and, 105
 examination for 106
 on submucous of small intestine, 113
 in twin development, 573
Neoplasm in frogs, 467
Nephritis following cobra bite, 397
Neurophaga, parasite of *Eudolichus* name 80
Neurasthenia in the tropics, 72, 73
Neuritis, central and pellagra, similarity 893
Neurosis, vegetative of child see Salter-Swift
 Feer disease
Nipponitrypanosoma in rats, immunity 120
Nocardiosis, (721)

- Oncocercosis rotunda
 infection in Europe, 134
 microfilaria in deep tissues, 595
Oncocerciasis
 in Africa, 363
 ocular 135
 America, 583
 Belgian Congo, ocular, 134
 Cameroon, (596)
 England (Liverpool), 126
 Guatemala, 583
 I. of the Coast, ocular 125
 Mexico, 593
Onchocerciasis intermedia of *S. iverica*
 biocenosis of, 584
 synonymy 7
 leprosy breeding conditions of, 109
Ophthalmia in Egypt
 gonococcal, 435
 Hospitals, report 1834, 452
 schools, treatment, 432
OPHTHALMOLOGY TROPICAL, 413-421 E
 908, see also Eye diseases, 908
 other areas of 420-421
Ophthalmology
 difficulties met with, 804
 vitamins and, 804
Ophthalmoma, treatment, fusiform, 539
Optic atrophy
 in Tongoland, 431
 and choroiditis, 431
 following surgical treatment, 431
 in trypansomiasis, 431
Oriental sore see Leishmaniasis
Ornithodoros spp. see species of relapsing fever
 347
 strains
 selected with *Spirochaetes* in Tasmania,
 post-embryonic development and sex
 83
 horse as vector of relapsing fever
 California, 53, 312-318
 pedipillies transmitting relapsing fever, 60
 southern [?] as vector of relapsing fever
 Cyprus, 318
 tsetse fly-host relationships in America,
 693
 horse as vector of relapsing fever, 317
Oroya fever see CARRION'S DISEASE
Oscarella sp. in Jamaica, distribution, 18
 identification, 561
Otoscopiasis due to *Wolffella* *magister*, 72
Otosclerosis following otitis treatment, 72
Pandanus app causing ocular dermato-
 ectropionitis 622
 infection, treatment with imiquimod
 plate, 622
 was conjunctivitis caused by 488
Papilloedema and epidemic diphtheria 62
Peptid galactosa, experimental typhoid
 of, 657-665
PAFFATACI FEVER, 444-445
 in Armenia, 35
 Istria, 444
 Spain, 444

Paragonimiasis
in China, 453
Manchuria, 92
epidemiology investigations in China, 455
treatment
carbam subcutaneously 561
emetine 92
agonimus, rat as host, in China, 92
paragonimus westermani
development of embryos, (92)
larval stages of, in China, 91
mitacidium of, 91
ralyse
general, and tubercles in Siam, 454
system- vegetative nervous, of children see
Selter Swift Feer disease
rashes
flagellate, toxicity of bactericidal substances
for 499
vectors and poisonous animals (book
review) 413
uratic diseases, medical treatment (book
review) 327
urology
clinical, and tropical medicine [de Rivas]
(book review) 82
and Fauna of Southern Tadzhikistan, mat
erials on, (book review) 331
human (book review) 160
introduction to [Chandler] (book review)
567
textbook, of (book review) 330
medical, practical course of (book review)
330
zoology and (book review) 419
trypanophid A simulating dengue, 53
trypanophid fevers, prevalence in China, 455
tria green, analyses of, 249
astereella organism, plague-like in Buenos
Aires rats, 370
astereella pestis
action of bacteriophage on, 371
cultivation
antagonism of other bacteria to, 873
influence of organ lysates on, 875
differentiation from *Pasteurella pseudotuberculosis*
rodensteinii 370
examination of bone marrow of rodents for
362, 370
fibrinolytic specificity 875
pathological
Society of North Argentine proceedings of
5th and 9th Conferences of
(book review) 570-571
specimens, preservation of, in tropics, 635
pathology clinical, outline of for African
medical assistants (book re
view) 640
schistosoma haematobium capitis studies on population
of, 837
filagra and Pelegra-like Conditions in Warm
Climates (special article) 729-
741 815-823 833-861
filagra see also DEFICIENCY DISEASES
in Africa, 730-735
prisons, 822
America, Central, 710
Australia, 740

Pelegra—cont'd
in China, 736-738
Manchuria, 738
Dutch East Indies, 409 740
India, 735-738
Japan, 738-739
Korea, 738
Malaya, 739-740
Nigeria, in children, 839
Philippines, 739
Siam, 739
Turkestan (Russia) 738
West Indies, 741
adrenalin sensitivity in, 805
central neuritis, similarity between, 893
in children, 734 824 825 899
diagnosis differential, 815 887
and kwashiorkor 734
latent, 818
in lepers, 735 738
in mental institutions, 731
in millet-eaters, 892
neurological resemblances to delirium
tremens, 410
in prisons 732, 733 822, 896 833 839 890
secondary in Glasgow 832
statistics in Tyrol 822
symptoms, 731 733 734 736 737 738
739 816-824 833-894
burning feet, 740 823 894-896
exanthema, sites of 818 819 821 823
folliculitis, 890
glossitis 835-837
oedema, 821
pigmentation, 822
retrobulbar neuritis, 839
serous skin affection, 833-839
stomatitis, 817 833
treatment, 409
diet, 836-834
Pfeifferella ekmanii causing septicaemia, 474
Pharmacopoeia and guide (Carmichael Hospital,
Calcutta) (book review) 641
Phialophora verrucosa, relationship with *Hormo-*
dendrum compactum 473
with *Hormodendrum perdrosoi* 473
Phlebitis and boutonneuse fever 810
Phlebotomus in Taishkent, blood feeding habits,
829
a gentiles transmitter of kala azar in India,
18 27
longipalpus and kala azar in Brazil, 501
major in Greece, relation to kala azar 500
psyllid bites "harara" and, 445
parasites in Macon, France 20
unguis; development of *Leishmania tropica*
in, 17
Phylctenular disease in Egypt, 805
Philarca clavata n. sp., 808
Physiological differences in Europeans and
natives in Batavia, 71
Paraspiris spp., as intermediaries of *Schistosoma*
4 5 11 12, 13 97 552, 558
Piedra in Dutch East Indies, 140
Pink disease see Selter Swift Feer disease
Plata
in Ceylon, 140
Haiti, 467
Mexico, campaign, 140

Babes—cont.
 symptoms, 746
 transmission, role of vampire bat, 742
 treatment
 at Marseilles, 328
 decentralisation of 323
 in Palestine, 749
 effect on incubation period in man, 323
 on other diseases, 326
 experimental in rabbits, 323
 paralytic accidents following, 324-325
 phenol-ether vaccine of Hempt, 322
 aero-therapy in mice, 223
 statistics of
 Aug 1928-1932, 328
 Instituto Camara Pestana, Lisbon,
 1921-1934, 748
 Manila Bureau of Science, 1914-1933
 749
 Pasteur Institutes, 1933, 747
 in Paris 1934, 324
 Uganda in, 323
 vaccination of dogs
 prophylactic, 326
 proposed in Indo-China, 760
 role of in rabies control, 750
 source, 482
 modification of Semple's made in
 Palestine, 486
 virus
 crossed immunity tests with fixed and bat
 viruses, 742
 site test
 in synapses with yeast, 317
 unsuccessful, 317
 destruction by nemoleate of sodium, 744
 differentiation from virus of pseudorabies
 of Ajyotsky, 748
 effect of glycerine, freezing and drying,
 316-317
 evolution of compared with vaccinal
 virus, 319
 filtrability tested within animal body, 317
 fixed
 examination of, 316
 experiments on, 743
 Paris strain of, 326
 and New York strain compared, 244
 production of Negri bodies, 318
 resistance to physical and chemical
 agencies during sub-passage,
 326
 retransformed into street, inoculated
 into dog, 317
 and street, inoculation of dogs,
 rabbits and guinea-pigs in
 different positions, 318
 susceptibility of Chinese hamster, 751
 transformation into street, 326
 low temperature experiments, 743
 modification after passage, 744
 neuroprobase, 317
 preservation in medulla, 316
 of pseudorabies of Ajyotsky, 746
 differentiation from rabies virus, 746
 street
 affinity for neoplastic cells of tumours,
 750

Rabies—cont.
 viruses—cont.
 street—cont.
 effect of ricinoleate of sodium on, 744
 Kegri bodies in, 319
 Rat(s)
 breeding rates, 873
 destruction by
 cyclophilite, in steamers and traps, 46
 cyanogen, 466
 cyanag, in native huts, 466
 intestinal protease in relation to pH
 intestinal contents, 26
 poison, 678
 virus, testing of, 462
RAT BITE FEVER, 58-59, 355-356, 494-495
 in Austria, 356
 India (Poondicherry), 254
 Lithuania, 253
 Poland, 355
 Rostock, 58
 isolation of *S. enteritidis* from patient
 blood, 58
 changes *in situ* surrounding vessels and
 of hair produced by *S. enteritidis*
 seeds in mice, 59
 from kitten, 699
 in a monkey, 699
 in paroxysmal women, 254
 prophylaxis, neosalvarsan, Salier et al.
 treatment
 bivalent intramuscularly, 704
 methanol, 700
 neothiamine, 699
 neosalvarsan, 256
 novanemocobenzil tetrahydroxy, 704
 salicyl, 256
 " Red fever " of the Congo and yellow fever
 protection tests, 53
RELAPSING FEVER, 54-62, 247-248, 494-495
 see also Spirochaetes et al.
 relapsing fever
 in Algeria, 345
 China, 435, 691
 Cyprus, 348, 349
 India, 54
 Palestine, 693
 Tunis, 54
 U.S.A.
 California, new tick vector, 53
 Texas, 347
 congenital, 694-695
 immunity, 695
 serology in human beings, 64
 spirochaetes
 combination with gold compounds, 50
 cross-immunity tests, 696
 cultivation, 693
 determination of thickness by microscopy,
 69
 evaluation, 69
 observations on life-history, 697
 pathogenicity for various animals, 691
 susceptibilities to total rays from vector
 isosp, 57
 symptoms
 endocytosis, (248)
 leucocytosis, 113
 paroxysm, facial, 349

- Relapsing Fever—cont.
transmission
experimental, to guineapigs, by *O. erra*
sacs suspensions in Tanks, 54
in milk of guineapigs, 694
intra uterine, 694
Ornithodoros spp. 347
erraticus 54
hermsi (348)
in California 55 347 348
pepillipis 683
sennaya (?) in Cyrenaica, 349
terulata 347
Rhipicephalus sanguineus 348
treatment
chrysobase 698
convalescent serum, experimental study
698
invosalvarian, 695
neocical intramuscularly 349
neosalvarian 347
lenghus poisoning 81 (725) 805
leptiles potassous, of Mexico, 379
REVIEW AND NOTICES, 82-84 160-168
250-252, 327-332, 412-416
497-498, 587-572, 640-644
726-728 809-814 880-884
871-872
Uthophaenogitis matthiae due to yaws, 966
Rhipidophorus sp. spirochaetes in blood of 349
Rhinochroma in Dutch East Indies, 720
characteristics, 720
Rhinospriodiosis
in India, 720
Italy single case, 720
North and South America, 720
following eye injury 720
pathology 720
Rhipicephalus sanguineus
incidence on dogs in Morocco, 435
and São Paulo typhus, 424 427
as vector or relapsing fever 348
of São Paulo typhus 427
Rhombomys opimus (?) sand eel spirochaetes in
blood of, 349
Rickets in South Borneo 719
Rickettsia, see also under TYPHUS GROUP OF
FEVERS
cultivation, 43
caris 48
Ringworm see Tinea
Rockefeller Foundation, annual reports 1834 and
1835 (book reviews) 185 882
International Health Division, annual
report 1934 (book review) 168
Rocky Mountain fever see under TYPHUS
GROUP OF FEVERS
Salt loss and ill-health in hot climates, 72
Semandarin, restorative action of 483
Sandflies, blood feeding habits, 928
MADFLY FEVER, 51-53 see also under
DENGUE AND SANDFLY
FEVER
in India, 53
blood and serum experiments 53
Sarcocystis tenella experimental research, 490
Scarlet fever, Norwegian 145
Scarlet fever in Africa, tropical 454
China, 455
- Schinopsis lorentzii* causing dermatitis in
Northern Argentine 146
Schistosoma possible eradication by planting of
Balanites spp., 11 657
- Schistosoma bovis*
antigenic properties of extract of 95
eggs of 2, 3 4
resembling those found in man in
Katanga, 552
mollusc hosts, 4 8, 97
fertilized eggs of 3
Acanthobilharium see also Schistosomiasis haema-
tobium
cercariae of 6
definitive sites in pelvis, 951
eggs of 552
mollusc hosts, 1-15
Ampullaria sp., 11
Bulinus spp. 7 9 10 11 12, 94 463
532, 553 554
Ulezoides sp. 12
Physopeltis spp. 11 12, 13 97 552, 556
unrecognized eggs of 3
intercalatum
eggs of, 4 5 552
resembling eggs found in man in
Katanga, 552
mollusc hosts 4 5 13
japonicum
action of antimonials on, *in vitro* 97
antigen, intracutaneous test with 956
cercariae of 6
Skin reaction due to 556
mollusc hosts, 1-15
Blausfordia spp. 7
Katayama nasophora 1 5 6 7
Oncomelania sp., 7 956 959
- mansonii*
cercariae of 6
comparative action of tartar emetic and
ficain on, *in vitro* (955)
eggs of influence of size of host on excretion
of 552
mollusc hosts, 1-15
Australorbis spp. 94
Bulinus sp. 11
Melanoides sp. 12
Physa acuta 953
Planorbis spp., 9 10 11 12, 13 14 15
95 552, 553 555
monkey hosts, 13 14 94
specific action of some drugs on experi-
mental infections of 954
maternal eggs of 3 4
resembling eggs found in man in
Katanga, 552
spindale eggs of, 3, 4
mollusc hosts, 6
radula eggs of, 3
- Schistosome* dermatitis studies on, 554 555 556
Schistosomes
antimony content of drugs lethal to (98)
carriage from man to man with special
attention to mollusc hosts,
1-15
cercariae of 5 6
dermatitis due to, 554 555 556
cultivation of *in vitro* 96

Schistosomes—cont.

- destruction of
 - by chemicals, 8
 - drying of waterways in Egypt, 8, 92, 93
 - planting of *Balanites* spp., 11, 557
- eggs of sun and outline, 2, 552

Schistosomiasis

- general
 - control, 8, 92, 93, 97, 483, 557
 - in China, 455

Egypt, 8, 92, 93, 957
South Africa, 97, 557
Swaziland, 557

surgical conditions in, (355)

treatment duration of, 933

treatment with

- anthocephalum*, 557, 932, 953, 959
 - compared with tartar emetic and metine, 958
- carbon tetrachloride, 558
- emetine compared with anthocephalum and tartar emetic, 958
- fuscina, urinary excretion, *anthocephalum*, 937
- oxyphenonium derivati, 958
- tartar emetic, 958
 - compared with anthocephalum and metine, 958

haematochezia

- in Abyssinia, 553
 - Algeria, 10
 - Arabia, 9, 14
 - Bechuanaland, 13
 - Belgian Congo, 4, 13, 552
 - Cochin China, 14
 - Cornwall, 4, 9, 553
 - Cyprus, 9
 - Cyrenaica, 10, 96
 - Damascus, 14
 - Egypt, 7, 8, 92, 93, 953, 957
 - France, 9
 - French Equatorial Africa, 4, 13
 - French Guinea, 13
 - Gold Coast, 13
 - Iraq, 14
 - Italian Somaliland, 11, 553
 - Ivory Coast, 953
 - Liberia, 13
 - Libya, (94)
 - Madagascar, 12, 952
 - Mauritius, 12, 94, 483, 554, 717
 - Nigeria, 13, 551
 - Nyassaland, 12
 - Palestine, 9
 - Portugal, 9, 10
 - Portuguese East Africa, 12
 - Senegal, 13
 - Sierra Leone, 13
 - Southern Rhodesia, 13, 951
 - Sudan, 11
 - Swaziland, 2, 557
 - Syria, 9
 - Tripoli, 10
 - Tunis, 10, 553
 - Union of South Africa, 97
 - Zanzibar, 11
- and appendicitis, 553

Schistosomiasis—cont.

haematochezia—cont.

diagnosis

- complement fixation test, 85
- cotaneous test, 851

epileptiform convulsions in, 85

haemorrhoids, 555

hedgehog, experimental infection of, leucocyte count in, 93

and malaria, 463

myelitis in, 951

prophylaxis in East Africa, 553

pulmonary haemorrhage, 93, 95

urinary treatment by isoseda, 94

Japan

- in China, 6, 7, 455, 553, 554, 559
- Fukien, 7
- Japan, 6
- Philippines, 7

diagnosis by cotaneous test, 5, 487
new antigen, 955

epilepsy in, 956

"labors" and, 558

maneater

- in Antigua, 94
- Arabia, 14
- Australia, 9, 15
- Belgian Congo, 4, 13
- Brasil, 15, 94
- Cochin China, 14
- Dutch Guiana, 15, 94
- Egypt, 7, 92, 93, 953
- Eritrea, 553, 555
- French Equatorial Africa, 4, 13
- French Guiana, 15
- French Guinea, 13
- French St. Martin, 15
- Gold Coast, 13
- Gendakope, 15, 94
- Italian Somaliland, 553, 557
- Kenya, 11, 554
- Liberia, 13
- Madagascar, 12, 952
- Martinique, 94, 557
- Montserrat, 94
- Nevia, 94
- Nigeria, 13, 551
- Nyassaland, 12
- Porto Rico, 14, 94, 553, 559
- Portuguese East Africa, 12
- St. Lucia, 14, 94
- St. Lucia, 94
- Senegal, 13
- Sierra Leone, 13
- Southern Rhodesia, 13
- Sudan, 11
- Tanganyika, 11
- U.S. America, 15
- Venezuela, 14, 94

anaemia in, 554

exacerbation of fever with splenomegaly, 99

diagnosis

- complement fixation test, 85
- cotaneous test, 851

haematological studies on, in Pernicious anaemia, 555

haemorrhoids, 555

pulmonary arteritis, 98

- Scorpion**
 antivenom, 400
 fatal sting, 399
 physiological saline injections in poisoning by, 400
- Succowidae** Longejugularis root, toxic principle 603
- Selzer Swift Fever disease** 629
- Sepedonidm**
 infection, fatal case, 144
 sp. Hans & Schenck as n. sp. of *Histoplasma* 491
- Septicaemia**
 in Indo-China due to *Pf. vivax* 474
 bovine, haemorrhagic, experimental transmission by fleas 486
- Shellfish bites**, poisonous, 478
- Simulidae** in South Africa, 243
- SLEEPING SICKNESS** 169-212, 645-678
 Sleeping sickness see under *Trypanosomiasis*, human African
- Smallpox**
 in China, 455
 Kenya, 465
 lymph, bacterial content reduced by brilliant green, 482
 statistics
 British India, 859
 Dutch East Indies, 859
 vaccination in Liberia, 458
- Snake(s)** see also *Venom(s)* snake of Italian Colonies in Africa, 379
 Mexico, 379
 North America, 379
- bites**
 cobra, diffuse nephritis following, 397
Echis carinatus treatment by antivenom, 387-390
Pelias berus (393)
 treatment
 in India, 397
 euphorbiaceous juice, 724
 physiologic saline, 400
- Sodoku** see **RAT BITE FEVER**
- South African Institute for Medical Research**, report for 1934 (book review) 82
- Spergennium** proliferation relation to *D. errans* 68
- Specimens** pathological, preservation of in tropics, 635
- Spider(s)** "Knopple spider" bite, 402
Lestodectes agoyangyang 402
 poisoning, 401
 venoms (book review) 812
- Spirillum minke**
 spontaneous infection of a monkey, 699
 of white mice 200
- Spirochaete** transmission, mode of 700
- Spirochaete amboina n. sp.**, 693
- anemia** life history 691
 autoimmunity causing disease of Well type 59-60
 buccalis life history 691
 canicola infective for man and dog, 62
 canineatology of 84
 commandoni n. sp., 693
 duttoni infection in laboratory animals, reticulocyte response in, 188
 life history 691
- Spirochaeta duttoni**—cont'd
 persistence of brain and organ infections in mice exposed to alcohol, 55
 therapeutic action of chrysobios os, 696
- Aberdonitis infection** in Hanoi, 353
- Hippocrate cross-immunity test**, 698
 in milk of infected guinea-pigs 694
 pathogenicity of Algerian strain, 693
- Leishmaniasis** in rats, in Rousset 61
 in Tonking, 81
- macrodinium** characteristics, 693
- microdentum**, characteristics, 693
- moysi** transmission by *Pediculus corporis* 694
- pollida** life history 691
 recurrent combination with gold com pounds, 56
 cultivation, 693
 meningism caused by 113
- ekolodonta** characteristics, 693
- interrodonta** characteristics, 693
 subekolodonta combination with gold com pounds, 56
- respiratoria** life history 691
- Spirochaetes**
 human communal, cultural characteristics, 693
 isolation of 692
 of relapsing fever combination with gold compounds, 56
 determination of thickness by microscopic examination, 58
 serological investigation, 54
 susceptibilities to total rats from mercury lamp, 57
 in wild rodents in U.S.S.R. 349
- Spirochaetoma, canine** 255
 fowl, infection and immunity conferred by inoculating culture spirochaetes, 57
 thickness of spirochaete determined under microscope, 58
- Spleen**
 hydatid cysts of (book review) 814
 and resistance (book review) 183
- Splenomegaly**
 in Egypt, 153
 (Egyptian) in Kenya, 934
 hepato-
 with arthritis, 475
 diagnosis, 475
 tropical and Egyptian, (638)
 in leprosy, 603
- SPRUCE**, 63-70
 in Mauritius, 463
 Porto Rico 66
 aetiology, 67
 fat content of faeces, determination of 68
 fungi, intestinal, in relation to, 63
 hyperchromic anaemia in spruce-like con ditions experimentally produced in rats, 70
 non-tropical
 in Belgium, 63
 Holland 69
 duodenocoele fistula simulating 69
 in pregnancy, ectenia complicating 65
 roentgenologic changes in small intestine in, 63-64-65

- Sporo—cont.**
 treatment, 68, 67-68
 vitamin deficiency and, 65, 67-68
- Stenomyia**, characters of, 345
- Stictodon maculatus** n. sp. in dog, 91
- Strongyles**
 infection, pathology of, 119
 treatment, gentian violet, 170, 583
 tauric emetic, 120
- summer free-living cycle**, 588
- propagation of**, 120
- strigovial evolution of**, 587
- Surgery** in subtropical regions, pre-antibiotic measures, 159
- Synophylla fergusoni** n. sp., 869
- Syphilis** *see also under Yaws and Syphilis*
 in Australian aborigines, 902
 China, 455
 bejel—hyperkeratosis and depigmentation in, 968
 and leprosy, 304
 primary and yaws simultaneously, 964
 resistance of patients to re-inoculation with *S. p. fergusoni*, 967
 treatment, mapharsen (arsenoxide) experimental, 673
 seceryl, 659
- Syphonia** in half plasmodia from, 77
- Taenia** and general paralyses in Sam., 454
- Tadpo Complex** Expedition of 1932 (book review), 331
- Taricha schizodon**: domestic birds in relation to developmental cycle of, 563
 eggs, 564
 infestation in Victoria, Australia, 564
 in cat, 565
 cerebral cysticercosis and, 565
 infection in man, 102, 565
 in pig, 565
- Taeniasis**, diagnosis, radiology, 576
- Tarponurus** infection in British Guiana, 145
- Temperatures, tropical**
 aluminum paint as protection in, 629
 reaction of human body, 628
- Tetany and anorexia**, 537
- Tharikana, 721**
- Therapeutics, tropical**, handbook of (Chopra) (book review), 641
- Thrombo-angiitis obliterans**
 in Arab woman, 157
 and typhus, 42
- Thrombocytes**, estimation of, in blood, 800
- Ticks**, role of in disease transmission, 537
- Ticks decolorans fergusoni** 141
 subadult, limnel types, 140
 in Englishman in Arabia, 140
 South Borneo, 718
- Amorous**
 in Algeria, 141
 resistance to reinfection (experimental), 141
- Tokelau** *see* *Tarsus subrufus*
- "Tokom-bakko" *see* *Lima*
- Trachoma**, 448-450
 in China, 455
 Egypt, 453, 903
 Glasgow, *Bacillus granulosus* associated with, 450
 Jeddah, 719
- Trachoma—cont.**
 in Palestine, 903
 in young people, 923
 Sova, 493
 acquired in infancy, 903
 blindness, diminution in Italia edoca, 449
 chronic, intractable, treatment by dioxane fraction, 449
- Cytology**, 902
- dust and**, 905
- elementary bodies in**, 450, 453
- follicles in second stage**, 902
- human inoculation**, 449
- hypers. and**, 903
- infectious agent**, filtrability of, 45, 47
- infectivity of**, 449
- pannes, rarity of in Palestine period**, 93
- relationship to conjunctivitis**, 901
- transmission, contamination**, 901
- treatment**
 arach., 453
 chalcoscyr. oil, 449
 debricated bee venom, 903
 quinine, 450
- Trematodes**
 in Halton peasants, 453
 Sova, 493
 leprosy and, 937
- Tryptamine** central action of copper derivative on, 684
- Tritonella** infected with *T. ovata*, 61
 placenta, not parasitized by *T. ovata*, 61
 subfasciata, critchilla of, infected in sea 211
 roundworm in, sp., 674
- Trichinella in rabbits**, antitoxin, 124
- Trichinella spiralis**
 development in abnormal environment, 52
 in experimentally infected rats, 34
 infective larvae, numbers spp., 22
 infectivity after rabbit passage, 52
- Trichomonas**
 in Cebus, 590
 complications, cardiovacter, 123
 diagnosis
 haematochemical, 592
 laboratory, 593
 ectoparasite, persistence of, 123
 experimental in rats, 591
 haemoproteid in, 122
 immunology 123
 treatment
 neosulphonam., 590
 in rabbits by irradiated epithelial +
 colostrum lactate, 123
 thymol, 590
- Trichomonads**, serological studies, 49
- Trichomonas**
 infection, experimental, 713
 of *Natrix erythrogaster* morphology of, 49
- America**
 in association with *Blattellida*, 713
 carbonase, action on, 714
 morphology of, 490
 non-pathogenic to cats, 713
- Trichophytes** spp., 141

infection
infection, dry conservancy and, 548
epidemiology in Porto Rico, 107

trichina
blood picture 588 589
incidence in Kentucky U.S.A., 573
infestation, anaemia, pernicious in, 586
in Louisiana children, 588

phodercatocercosis *see* Seltzer Swift Fever disease

practical
diagnosis [Blamson] (book review), 160
laboratory diagnosis and treatment of (book review), 328
not occurring in Dutch East Indies, (627)

medicine clinical parasitology and [de Rivas] (book review), 82
clinical text-book of [de Langen] (book review), 161
lectures on [Fröde] (book review), 84

ophthalmology *see* OPHTHALMOLOGY

TROPICAL

ulcers *see* Ulcers, tropical

spikes

neurasthenia in, 72, 73
salt loss and ill-health in, 72
variation of cosmopolitan diseases in, 454

Trypanosoma cruzi

resistance to tryparsamide 203
treatment, 203

brevis characteristics, 666
infection, influence of DCG on, 206
in rats, treatment by copper protoxide 684

infectivity to cattle, 175
old laboratory strains of, 196
in rats, Fulton's reaction, 187
transmission by *G. morsitans* and *G. palpalis* 652
hereditary in white rat, 652
treatment, Surica C. 175

catallopi: development of in *Glossina*, 180
disinfection of, 181

congoense characteristics, 668
mechanical transmission, 175
metabolism, nitrogen and mineral, in infections with, 187
nutrition as influencing course of infection with, 184
in rats, Fulton's reaction, 187
re-infection experiments in game 175
treatment, Surica C. 175
var. dimorphus, development of in *Glossina*, 181 182

cavalli
in armadillo (*Chlamydectes* sp.) in Argentina 211
characteristics, 675
cyclic growth in tissue culture of embryonic heart muscle, 677
infecting *Triatomae* infections 678
kittens as carriers, 676
in monkeys to Java, 211
reduviid bugs in relation to, 211
similarity to *T. evansi* 675

dimorphon-congoense group: cyclical development in *Glossina*, 181 182

dakonis: infection in normal and in splenectomized rats, 671

Trypanosoma equiperdum
metabolism, effect of fermentable carbohydrates, 184
glucose, 670
in rats, effect of diphtheria toxin on, 205
trypanotoxins of 198

mauritanicum infection in Mauritius, 630

gambiensis antelope as reservoir 667
antigen value, relation to chemotherapy 200
development in *G. tachinoides* effect of high temperatures on, 182
infection in laboratory animals, reticulo-lyocyte response in, 186

old laboratory strains, 196
protective action of Bayer 205 against infection with, 658
transmission (experimental) by *G. palpalis* 653
trypanotoxins of 198

leucostoma: cultivation in latex of *Euphorbia* 672
development of age immunity in young rats, 669
glucose metabolism, 670

maveranahum, cutaneous localization in guinea-pig, 671

peroni: cyclical development in *Glossina*, 183
relationship to *T. brucei* 183

rhodesiense

infectivity in crop of *G. palpalis* 632
for *G. morsitans* 179
old laboratory strains of, 196
protective action of Bayer 205 against infection with, 658
susceptibility to action of human serum after passage 184
of hyrax and dikdik, 649
transmission by *G. morsitans* from man to man through sheep 651

rodriguezi
in pigs in Belgian Congo 668
relationship to *T. annae* 668

riparium characteristics of 649

thelephera infection in Mauritius, 650

verpulianum similarity to *T. evansi* 675

vivax characteristics, 666
immunity of pigs to 683
infection in Mauritius, 650

Trypanosome(s) action of atoxyl on, 663

antelope as reservoir 645

antigenic properties of 684
relation to chemotherapy 200

cells, chemotherapeutic action, 672

chemotherapeutic agents, mode of action of 188, 189 672
influence of mixed infections, 188, 189

classification, 648

cyclical development in *Glossina*, 180 181 182, 183

drug resistance in, 171 203 204 648 647

laboratory strains, drug-resistance of 197
length of infectivity of, 196

mammalian, systematics of 647

polymorphism of *brucei*-*rhodesiense*-*gambiense* group 183

trypanotoxins production, 198

Trypanosomiasis see also Trypanosomes, Trypanosomes, Glossina and Tsetse flies
 animal, 203
 in Mauritius, 650
 Portuguese Guinea, 176
 antagonism (supposed) to tuberculosis, 206
 B.C.G. experiments in, 206
 bovine
 in Mauritius, prevention, 464
 Nigeria, 172
 Uganda, 173
 diagnosis, 657
 by gland puncture, 188
 high resistance of Gold Coast cattle, 203
 immunization, 668
 mixed infections, 666
 prophylaxis
 Surfen C. (experimental) 173
 tartar emetic, 173
 treatment
 antitoxosan, 663
 drug-resistance, 163
 Surfen C. 663
 tartar emetic, 172, 663
 diagnosis, Feltov's reaction, 187
 domestic, 668
 equine in Mauritius, prevention, 464
 immunization by protective inoculation, 193
 in Africa, 195, 664, 668
 with salivary araea, 194
 nitrogen and mineral metabolism in
 T. congolense infection, 187
 nutrition in, 194
 porcine
 in Africa, 649
 Belgian Congo, 667
 prophylaxis
 irradiation in experimental infection in
 rats, 203
 neosalvarsan, 196
 sofa-salvarsan, 185
 research in Mauritius, 463
 treatment, 203
 experimental in baboons (*Papio ursinus*),
 637, 668
 human
 African (sleeping sickness)
 in Bechuanaland, 178
 Belgian Congo 648, 661
 Foreman report, 1934 646
 Kenya, 661
 Nigeria, southern, 172
 Portuguese Guinea, 176
 Tanganyika, 173
 Nyanga settlement, 174
 Uganda, Human Trypanosomiasis
 Research Institute report
 1935 645
 ataxicic meningo-encephalitis in, 189
 attenuated, 666
 carrier human, 664
 central nervous system, changes in,
 656, 657
 diagnosis, 647
 experimental, myelin lesions, 657
 immunization, 664

Trypanosomiasis—cont.
 human—cont.
 Africa (sleeping sickness)—cont.
 number puncture in, 647
 meningo-encephalitis in, Scaple
 solder 179
 ocular troubles due to treatment, 21
 431
 prophylaxis
 in Tanganyika, 173
 Bayer 203, 657
 experiments on volunteers, 657
 research, 645
 serum, trypanocidal action of, 19
 symptoms
 extra-pyramidal syndrome, 19
 meningo-encephalitis, 651
 pleio-choroidal changes in, 177
 transmission
 experimental, 661, 663
 by human carrier, 654
 of *T. schiedemani* by *C. simuli*
 from man to sheep and cat
 to man, 651
 treatment, 646, 647
 antimony 661
 antipryate, 173
 aromatic compounds of sulphur
 protoxide-sulph products, 19
 stuxyl, 661
 danger of bifidation, 661
 (tryparsenyl) subcutaneously, 661
 guaiac reaction, 193
 Bayer 203 [Continued] in Africa
 malaria, 661
 effect of mixed infection, 177
 parasitocidal action of, 19
 in relapsing fever, 73
 composed S. 107 [Continued], 661
 Nigeria, 170
 control by leather practice, 60
 drug-resistance, 664
 glyphen, 666, toxicity of, 662
 guanidine derivatives (trypanocidal),
 204
 maphenyl (antipryate), 67
 mecamyl (Forsant), 70 *et al.* 661
 Bayer 203, 657
 blood coagulation test, 661
 and tryparsenyl, 667
 mecocryl, 658
 Sdi, 566 II, tests in Nigeria, 19
 sodium hypophosphate in skin
 trouble, 661
 sofa-salvarsan (trypanocidal), 194
 Surfen C. tests in Nigeria, 195
 synthalin (experimental), 204
 trypanocides (trypanocidal, cytolytic),
 171, 661
 in late cases, 179
 resistance, 171
 toxicity, 201
 value of mouse test, 662
 visual disturbances, 196
 trypanamide and Bayer 203, 17
 tryparsenyl, 647
 following so-called trypanocidal
 injection, 647

trypanosomiasis—cont.
 human—cont.
 African (sleeping sickness)—cont
 treatment—cont
 tryponaryl—cont
 with sodium hyposulphite, renal
 changes, 662
 tryponaril renal changes in, 202
 American (Chagas' disease *see also*
 T. cruzi)
 in Argentine 207, 208, 209 (876)
 (878)
 Caracas, (876)
 Chile, (878)
 Panama, 675
anaemia, researches on, 210
armadillos as hosts, 203, 211
cardiac involvement, (878)
Chagas' memorial number of the North
 Argentine Pathological Society 871
diagnosis, 675
 Machado reaction, 210
 unilateral conjunctivitis with oedema
 as early sign, 203
experimental infection of man, 676
prophylaxis, 675
symptoms, unilateral conjunctivitis
 with oedema, 203
treatment
 paroxyl, 209
 sulphurewood, 209
immunity in rats, 667
the fly *see also* Glossina
behaviour of baboon and monitor blood in,
 207
control, 654
 clearing, 658
 trapping, 465
distribution, 177
investigations and surveys in Kenya, 631
 Nigeria, 169
 Tanganyika, 653, 655
longevity of, 171
population in Nigeria, 171
utsugamushi disease *see under* TYPHUS
 GROUP OF FEVERS
tuberculosis
 in China, 455
 Hatti, 467
 Palestine, 466
 Papua, 718
 South Borneo, 718
antagonism (supposed) to magueya, 208
haemoptysis, use of antivenene, 399
human in Hong Kong, 157
 in West Indies, 157
and leprosy chemotherapy 614
in man in the tropics, 157
pulmonary
 in Sova, 493
 manifestations in schistosomiasis, 96, 951
tumours, malignant, of cervical glands (book
 review) 883
typhoid fever
 in China, 435
diagnosis, agglutination tests, 626
malaria and, treatment, quinacrine
 (atabrin) 789

Typhoid fever—cont.
 treatment, serum, 627
 typhus fever associated with, 433
TYPHUS GROUP OF FEVERS 32-51 417-443
 906-929
 in China, 455
 Indo-China, 39
 Minas Geraes, 40 915
 Union of South Africa, 906
 West Africa 432
boothouse fever
 in Athens, 438
 Balearic Islands, 431
 Belgian Congo 915
 Morocco 433
phlebitis and, 910
in relation to pseudo-typhus in Cochin
 China, 914
virus, cultivation of, 916
 multiplication in tissues, 917
Brill's disease and classical typhus 32
classification, 32, 33
 in India, 909
 criteria for 907
Coastal fever of North Queensland, 41
cross-immunity tests, 42, 912
diagnosis by skin tests, 42
endemic typhus
 in Alabama, 918
 Athens, 37 912
 associated with infected cat, 46
 Australia, 914
 fatal cases 914, 915
 Cochin China, 38, 39 (433)
 Dutch East Indies, 442
 Egypt, 39
 Indo-China, 432
 Manchuria, resembling Mexican
 typhus, 42
 Marseille, 910
 New Guinea, 41
 S Paulo *see under* São Paulo typhus
 1918
 Texas, 422, 423
 Tonking, 913
 Toulon, 927
 Union of South Africa 422 93
general discussion, 914
"Nozman," "Coastal" and ~~other~~
 classified fevers
 Queensland as 41
serum, protective in 36
skin eruption absent, 423
temperature curves in ~~acute~~ ~~fever~~
virus
 immunity tests at ~~acute~~ ~~fever~~
 marine straits
 isolation from guinea ~~acute~~ ~~fever~~
 susceptibility of ~~acute~~ ~~fever~~
 testicular injury ~~acute~~ ~~fever~~
epidemic typhus
 in Algeria ~~acute~~ ~~fever~~
 Babylon, 5

Typhus Group of Fevers—cont.

epidemic typhus—cont.

control in Upper Uganda, 906

in Rumania, 906

cross immunity between murine typhus and, 42, 43

immunity in guinea-pigs in relation to diet, 976

man as reservoir in Texas, 423

preventive measures, 40

vaccination against with living rat virus, 34

with living vaccine in Morocco, 923, (928)

rat

action of Zimmer's anti-typhus serum on, 43

alteration in association with *Sarcas* see #17

pathogenicity compared with murine typhus, 427

studies on culture strains, 916, 917

Texas strain behaviour in relation to diet, 926

Weil-Felix reaction in prophylaxis, 923

exanthematic fever in Lima, second case, 40

immunizing experiments with anti-typhus horse serum, 439

with bile-treated brain tissue, 35

immunization with Texas murine virus No 1, 437, 438

with virus from Uganda, Congo, 439

unapparent, 433

in Texas, 431

epidemiological importance of 38

Indian tick typhus, distribution and laboratory findings, 470

encephalitic symptoms, fatal case, 431

frequency of *Proteus* spp. agglutinins in hospital patients, 974

isolation of virus from man, 910

role of rat flea, 909

serological findings, 909

vector unknown, 37, 417, 418, 420, 431

Weil-Felix and Widal reactions in, 31

mata fever in Bolivia, 443

mites found in endemic districts of São Paulo, 424

"Mossman" fever of North Queensland, 41

murine typhus

cross immunity between historical typhus and, 42, 43

experimental infection of rats, 439

general discussion, 914

Proteus spp. isolated from human blood, 921

virus

absent from Athens mice, 913

in Alabama rats, 918

in Athens rats, 913

alteration by heat passage, 435

in case of Jaun unapparent infection, 915

cultivation on chick embryo membranes, 429

in Dakar rats, 916

development in fasting flea, 919

Typhus Group of Fevers—cont.

marine typhus—cont.

virus—cont.

longevity in brains of Culex pipiens, 4

in flea, 918

maintenance at low temperature, 47

mode of drying and cooling, 47

in Moscow rats and fleas, 918

multiplication in tissues, 917

pathogenicity compared with other typhus, 427

in Rumanian rats, 926, 921

search for in Rome, 429

studies on culture strains, 914

in Toulouse rats, 913

in Tunis mice, 45

new strain, 45

in Zagreb rats, 44

opossum as natural reservoir of virus in Mine Géorgie, 40

prevention after blistered vaccination, 437

in course of fever, 924

in dogs, 925

Proteus agglutination, 435

search for in culture from treated animals, 435

in Texas rats, 433

Proteus FK17, a Khabarovsk strain in process of development, 435*Proteus* OX11 agglutinins, 435*Proteus* vulgaris, transformation in *Proteus* XII, 435*Proteus* Y strain, biological and immunological characters of, 45

frequency of agglutinins in hospital patients in India, 434

Proteus XII agglutinins in spinal fluid, 45 from blood of murine typhus case, 42

frequent isolation of, 434

transformation from *Proteus* vulgaris, 45*Proteus* XII strain in process of development, 435

pseudo-typhus (Schaffner) in Culex Ochlerotatus, 914

Rickettsia are virus

cultivation, 42, 915

on membranes of chick embryo, 42

in dogs in Algeria, 46

of urban and rural types compared, 42

Rocky Mountain fever in Idaho, 47

Montana, 47

New York State, 47

Pennsylvania, 927

Western U.S.A., 446

relation to urban and rural types of 42

transmissible disease, 42

role of rabbit tick, 440

vaccination against, 47

virus, cultivation in developing chick embryo, 441

superfecund, 452

Weil-Felix reaction of rabbit in 47 nose, 923

São Paulo typhus

cultivation of *Rickettsia* or *anaplasma* of chick embryo, 425

- ches Group of Fevers—cont.
 São Paulo typhus—cont.
 transmission by *Amblyomma cayennense*
 40
 experiments with *Cimex lectularius* 428
 spp ticks and mites, 424 427
 serology of 32
 serum, protective in, 36
 skin tests in, 42
 Sumatran mite fever 421
 in Dutch East Indies, 422
 differentiation from tsutsugamushi disease 422
 experimental, in rabbits, eye lesions 49
 trichinellosis produced in rabbits by virus 49
 thromboangiitis obliterans and, 42
 tick typhus (?) in India 37
 tick bite fever in Union of South Africa, 908
 ticks on dogs in Rabat, 433
 found in endemic districts of São Paulo 427
 transmission
 experiments with ticks and fleas in Minas Geraes, 40
 to guinea-pigs through fleas, 919
 through nasal cavity of guinea-pigs, 918
 serum (experimental) 927
 tropical typhus
 in Benkoelen Residency 814
 Cochin China, 39 (433) 913
 Federated Malay States, 911 921 922
 pathology of 433
 Malaya, 32, 420 424
 cross-immunity between tsutsugamushi disease and, 460
 with primary scrotal and penile lesions, 432
 prophylaxis, vaccination, 421
 rural type in Dutch East Indies 442
 in Sematra, 421
 pathology of, 433
 relation to tsutsugamushi disease, 420
 urban type and Rocky Mountain fever 911
 research on, in Malay 424
 white rats as experimental animals, 425
 "urban"
 in Sumatra, 421
 rat-flea as vector 462
 research on, in Malaya, 424
 virus
 experiments, 460 461
 isolated from wild rats, 921
 Weil-Felix reaction in laboratory animals, 922
 of the tropics, 32
 tsutsugamushi disease
 in Federated Malay States, 911
 Indo-China, 432
 cross-immunity between tropical typhus and, 460
 differentiation from Sumatran mite fever 442
 intracutaneous reaction, 923
 relationship to scrub typhus, 420
 to urban and rural typhus and Rocky Mountain fever 911
Rickettsia tsutsugamushi, 441
 Typhus Group of Fevers—cont.
 tsutsugamushi disease—cont.
 and rural typhus, differential diagnosis, 426
 virus, experiments, 48 460 461
 in laboratory animals, 424
 tissue culture 442
 "total staining," 412
 Weil-Felix reaction, 922
 typhoid fever associated with, 433
 vaccination
 choice of route 433
 with dried and coated virus (Lalgret) 437
 dosage 437
 preparation, 427
 efficacy of different routes 433
 experimental with serum, 927
 with living bile-treated virus, premunition following, 437
 of man with attenuated rat virus (Blanc's method) 34
 with killed emulsions of *Rickettsia* from lice (Weigl's method) 34
 from rats and guinea-pigs (Zinsser and Mooser's method) 35
 with living attenuated virus in Morocco 925 (1926)
 with living rat virus (Nicolle & Lalgret's method) 34
 and premunition, 924
Rickettsia of Tunis murine virus, 433
 single and double 924
 with Zinsser's horse serum, 439
 virus
 attenuation, attempted, in guinea-pig cord by drying, 430
 by bile 35
 in cat in Athens, 46
 cultivation, 43, 428 429 916
 search for Proteus in, 435
 degree of infectivity according to route employed, 438
 demonstrable experimentally after cessation of fever 430
 development in fasting flea, 919
 electrotherapy causing disappearance in white mice 45
 historic, of Tunis, action of Zinsser's antityphus serum on, 43
 longevity in flea, 918
 opossum as reservoir in Minas Geraes, 40
 passage through nasal cavity of guinea pigs, 918
 pathogenicity of epidemic and murine typhus compared, 427
 preservation at low temperatures, 429
 protective action of antityphus serum (murine) 429
 rats, as carriers in Zagreb 44
 examination in Tunis interior negative for 423
 virus No. 1 of Tunis, feeble pathogenicity for monkeys, 44
 wild, in India, 419
 in New York City 424
 rural, in laboratory animals, 424
 squirrel, grey palm, as reservoir of in India, 420

Typhus Group of Fevers—cont.

virus—cont.

- susceptibility of cat, 925
- of *Citellus citellus*, 430
- of opossum, 818
- transmission to guinea-pigs through feces, 919

Tunis murine experimental immunization intranasally 437

urban, in laboratory animals, 44

from Lepus, immunity experiments, 439

variations in infecting and vaccinating power according to route of infection, 438

infection of in mice, 927

Weil-Felix reaction 38, 37, 33, 39, 41, 438, 809, 811

in Atherton dogs 438

some 16 are of uncertain origin, 60, 81

Ixodes typhus, 417, 418, 419

I. horator, animals 922

Mooreman, Coastal, and other unclassified fevers of North Queensland, 41

persons not suffering from typhus, 438

prophylaxis 923

rats in India, 419

in Rumania, 970

scrab typhus, 41

Trombicula f. m. m. causing gastro-enteritis, 631

Ulcera

corneal treatment with placental tissue and umbilical cord injection, 903

rodent in Australia 147

tropical

in Africa, 470

Indian tea gardens, 154

Italian bonafidland, 630

Auto nati ex, 158

Papua, 718

dust in connection with, 470

treatment 470

tale 831

Zapp, 630

Vaccination of guine-pigs by halo-treated virus, 35

Vegetables of hem, a biochemical analysis, 446

VENOMS AND ANTIVENOMS, 379-473Venom(s) see *Anti-enzymes*

scorpion

fatal poisoning w. th., 399

physiological saline injections in treatment for 400

shellfish, of Cow, spp. 478

snake

African, 382, 383

specificity of antivenenes prepared from 383

desiccation past, own, haemostatic uses, 394, 395

antigenic properties of detoxicated Indian and African, 382

of *Naja naja naja* and *N. naja naja* var. *ger* 383

blood changes resulting from, 390

alkali reserve reactions, 390

coagulating action, 387, 391

Bodrogi biochemical studies, 390, 391

Bothropotoxin prepared from, 391

Venom(s)—cont.

snake—cont.

Bodrogi *sinus* coagulating act. haemophilic blood, 38

fibrinase

clotting action and patient 390, 391

producing sepiaria, 397

Crassula coriacea, 384, 408

physiological saline injections in

treatment for, 409

cobra

action on circulation, 399

as analgesic, 398

Dubois, coagulating action on Med. 396

haemostatic use, 392, 393, 394

detoxicated by photodynamic act. methylene blue, 397

Echis carurus

coagulating action on blood, 391, 392

experimental investigation of, 393

treatment with heterologous serum, 397, 398

Formosan, basic substance in, 394

haemolysis caused by, 395

haemorrhage, attributed by to venoms, 397, 398

haemostatic uses, 391-394, 399

in accessible haemorrhage, 392

dental haemorrhage, 392

haemophilia, 392

thrombocytopenic purpura, 397

India, 332

detoxicated, antigenic properties, 396

specificity of antivenenes prepared from, 396

treatment for, 397

Naja nigriceps, ocular effect, 397

North American pit vipers, 397

N. cerastes cerastes, haemostatic uses, 397and *N. naja naja* var. *nigricollis*, pharmacology of, 397

prophylaxis against, 397

South African, toxic and actions properties, 394

specificity of antivenenes, 394

therapeutic, 397

ryder (book review), 312

Joseph, 402

Latrodectus apicalis sp. n. spectra, 401

Verres Permethryl reaction in leprosy, 392

Verreaux persicae see CARRION'S DISEASE

Vincent's angina in China, 719

Vital statistics of Daysak of South Bornea, 714

Iraq, 1905, "82

Papua, 718

Vitamins, role of in ophthalmology, 397

Wassermann reaction in leprosy, 391, 392

Water supplies of Federated Malay States, 397

treatment, chloramine 402

Well-Felix reaction in series of cases

origin, 50, 51

Well's disease in Canary Islands, 697

di a disease—cont'd
 in Cochin China, 354
 fatal cases, 354
 Indo-China, 353 397
 Tonking, 61
 anaemia in, 353
 atypical, 353
 anaemia in, 353
 cerebrospinal fluid in, 350 352, 355
 in a child, 608
 diagnosis
 cerebrospinal fluid examination, 355
 in meningitic forms, 350
 serum agglutination tests, 354
 in meningitic forms, 350
 epidemiology and treatment 62
 following dog bite 354
 haemoglobinuria and 511
 and Haemasi fever 59 60
 meningitis in, 350 351 352
 epidemic in children 350 351
 mental form of 351
 myocarditis in, 352
 paraplegia and, 351
 simulating influenza, 352
 spirochaetes of in Romeo rats, 61
 symptoms
 atypical, 352, 353
 cardiac, 352
 conjunctival infection, 352, 353
 haemorrhagic, 353
 influenza, 352
 meningitic, 350 351 352
 mental 351
 paraplegic, 351
 and tropical myositis, 607
schistosoma bancrofti see under *Filaria*
Uvulifer magnifica otomycosis due to 476
 oedema pigmentosum, 146
topipysa brasiliensis
 breeding under laboratory conditions, 359
 length of life influence of temperature and humidity on, 359
chagas
 breeding under laboratory conditions, 359
 longevity 678
 influence of temperature and humidity on, 359
 plague bacteriophage in, 370
 role of in typhus transmission, 909
 trachoma in South Borneo 718
WORMS AND SYPHILIS, 960-970
 worms
 in Australian aborigines, 962
 Guatemala, 963
 Haiti, 468
 India (koya disease) 961
 Jamaica, 960
 Liberia, 456
 Papua, 715
 Porto Rico 969
 South Borneo, 718
 schistosomiasis and, 908
 boomerang leg and, in Australia, 962
 cerebrospinal fluid in 963
 control in Porto Rico, 969
 crab disablement by 456
 distribution relation of environmental factors, 960

Yaws—cont'd
 pathology 964
 and poliomyelitis in Samoa, (1963)
 and primary syphilis simultaneously 964
 resistance of patients to reinoculation with
 Sp. pertenue 967
 rhinopharyngitis mytilana due to 968
 transmission to rabbits by *Hippelates pallipes* 961
 treatment
 bismuth salicylate 969
 neosalvarsan, 718
 Terpen Stahl A, 788
YELLOW FEVER, 333-347 615-624
 in Africa, distribution, 335
 Dahomey 333 334
 French Congo 333 334
 Gambia, 333 334 337 615
 Gold Coast 333
 Ivory Coast, 333 334
 Niger Territory 333 334
 Nigeria, 337
 Sierra Leone 333
 Togo, 333 334
 West, 616
 America
 Bolivia, 333
 Brazil, 333 334
 Colombia, 333
 South, 622
 Commission, report, (316)
 control
 in Belgian Congo 343
 Gambia, 337
 air travel, 335 343 344 345 617 618
 dengue and, (52)
 diagnosis histological, 334
 encephalitis, experimental influence of immune serum on 341
 epidemiology 333, 615
 hedgehog, susceptibility of 342
 immune bodies in blood of African animals, 339
 immunity 615
 in Belgian Congo 336
 duration of, after vaccination, 339 622
 International Air Traffic Health Agreement 617
 jaundice, febrile in relation to, 336 337
 monkeys, positive protection tests in 334
 339
 yellow fever in rural areas maintained by 339
 protection tests
 in Africa 335
 Belgian Congo 337
 India for air travellers, 618
 Java, 338
 Senegalese troops, 615
 in air travellers, 617 618
 on apes 339
 on monkeys, 334 339
 on sheep 339
 specificity of 333
 public health and, 616
 rural " in Gambia, 334
 role of monkeys in maintaining, 334 339
 shrews, reaction to neurotropic virus 342
 treatment [Mollaret] (book review) 569

Yellow Fever—cont.

vaccination

cultivated pastrropic virus of mouse embryonic tissue, and immune serum, 623

culture virus and immune serum, 335

immunity following, duration of 622

living dried virus coated with egg yolk, 619 621

living mouse virus (Langre's method) 339

length of immunity after 339

store of mouse virus in French

Equatorial Africa, 342

neurotropic virus (Langre's method) 618, 620

encephalo-myelitis following, 621

and immune serum, 619 620

meningo-encephalitis following, 618

620

safety of in endemic areas, 340

tryp

cultivation, 624

Yellow Fever—cont.

virus—cont.

experimental encephalitis in monkey, 6

French strain, abortion after power
washing, 622

inactivated, gamma-ray tests, C1

neurotropic

protective action against dengue

virus in A/ mice, 20

store of mouse virus in feces

Equatorial Africa, 343

susceptibility of Africa and Asia

monkeys, 624

of hedgehog, 342

virulence, variation after cultivation, C

virotropic, essential neurotropic, 26

inoculation from culture lots X New

233

" young green dormouse, possible contact

with bookworm larvae, 12

Zacca platypus, host of *Microtinea latipes*,

581

Zoology and parasitology (book review), C1

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MEDICAL AND SANITARY REPORTS
FROM
BRITISH COLONIES, PROTECTORATES
& DEPENDENCIES FOR THE YEAR 1934.

[Sixth Annual Issue.]

ERRATA.

- P 35* KENYA COLONY line 3 of section on *Vital Statistics for Genoese* 3,979 *read Goanese* 3,979
- P 245* MONTSERRAT 2nd line from foot of page *for a rate of 7 per 1 000 read a rate of 79 per 1 000*
- P 270* HONG KONG Infant mortality rate, Chinese 347.3 non-Chinese 49.8.

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1936

Yellow Fever—contd.

vaccination

cultivated pan-tropic virus of mouse embryonic tissue, and immune serum, 623

culture virus and immune serum, 535

immunity following, duration of, 622

living dried virus coated with egg yolk, 619 621

living mouse virus (Laugret's method), 339

length of immunity after, 339

store of mouse virus in French Equatorial Africa, 342

neurotropic virus (Laugret's method), 618, 620

encephalo-myelitis following, 621

and immune serum, 619 620

meningo-encephalitis following, 619

620

safety of in endemic areas, 340

trees

cultivation, 624

Yellow Fever—contd.

virus—contd.

experimental susceptibility in monkey, 6 French strain, alteration after growth passage, 622

inactivated, hemagglutiny tests, 424

neurotropic

protective action against neurotropic virus in M. rhesus, 31

store of mouse virus in French Equatorial Africa, 342

susceptibility of Africa and Asia monkeys, 624

of hedgehog, 342

virulence, variation after culture, 6

viscerotrophic, cerebral neurotropic, 6

inoculation from culture and live

335

young green deer, possible source

with hookworm disease, 12

Zero fly (juv. host of *Metapenaeus luteus*),

561

Zoology and parasitology (book review), 11

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VOL. 33]

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[SIXTH ANNUAL ISSUE.]

Summarized by P. GRANVILLE EDGE,

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London School of Hygiene and Tropical Medicine (University of London)*

Issued under the Direction of the Honorary Managing Committee of the
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1936

CONTENTS

	Page	FAR EAST—continued
Unfederated Malay States —		
	5*	Jobore — — —
		Kedah — — —
		Perlis — — —
		Kelantan — — —
		Trengganu — — —
		Brunei — — —
		Hong Kong — — —
PACIFIC OCEAN:		
		Fiji and Western Pacific —
		British Solomon Islands —
		Gilbert and Ellice Islands Colony —
WEST ATLANTIC		
		Bahamas — — —
		Barbados — — —
		Bermuda — — —
		British Guiana — — —
		British Honduras — — —
		Jamaica — — —
		Cayman Islands — — —
		Turks and Caicos Islands — — —
		Leeward Islands — — —
		Antigua — — —
		Dominica — — —
		Montserrat — — —
		St. Christopher and Nevis — — —
		Anguilla — — —
		Virgin Islands — — —
		Windward Islands — — —
		Grenada — — —
		St. Lucia — — —
		St. Vincent — — —
		Trinidad and Tobago — — —
SOUTH ATLANTIC		
		Falkland Islands — — —
VITAL STATISTICS FOR 1934 —		
	151	INDEX OF NAMES AND SUBJECT
ALPHABETICAL INDEX OF COUNTRIES.		
Anguilla	247	Gilbert & Ellice Islands
Antigua	241	Gold Coast Colony
Bahamas	216*	Grenada
Barbados	218*	Hong Kong
Basutoland	70*	Jamaica
Bechuanaland	81	Jobore
Bermuda	231	Kedah
British Guiana	223	Kelantan
British Honduras	229*	Kenya
British Solomon Islands	209*	Leeward Islands
Brunei	192*	Maltaise Islands
Cayman Islands	230	Mauritius
Ceylon	127*	Montserrat
Cyprus	112*	Nova
Dominica	243*	Nigeria
Falkland Islands	264	Northern Rhodesia
Federated Malay States	151	Nyasaland
Fiji	204	Palestine
Gambia	31	Penang
Gibraltar	119*	Perlis
		St. Christopher & Nevis
		St. Lucia
		St. Vincent
		Seychelles
		Serra Leone
		Singapore
		Somaliland Protectorate
		Strait Settlements
		Trengganu
		Trinidad and Tobago
		Turks and Caicos Islands
		Taungnyuwa Territory
		Trans-Jordania
		Trengganu
		Trinidad and Tobago
		Leeward Islands
		Uganda
		Virgin Islands
		Western Pacific
		Windward Islands
		Zanzibar

[Supplement to the *Tropical Diseases Bulletin* 1936 October]

THE CONTENTS OF COLONIAL MEDICAL REPORTS

A NOTE

By P. GRANVILLE EDGE

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Official health reports can scarcely be defined as popular literature it would seem that with the exception of the few who by virtue of official necessity are compelled to read such documents members of the medical profession at large are rarely interested in their contents.

And to the mind's eye sees stretching interminably away into a dim remoteness loaded shelves of printed matter whose pages contain a wealth of accumulated scientific experience but are doomed for the greater part to lie unread and unused. Whether this neglect and indifference may be attributed to faults inherent in the Reports themselves is a possibility the discussion of which lies beyond the scope of the present essay which serves merely as the introduction to the results of an important though somewhat exacting piece of work.

In the pages which follow an attempt has been made to present (for the convenience of those who have not read, or may never read the original documents) a very brief précis of each of the fifty and more Medical and Sanitary Reports relating to the widely scattered territories comprising the British Colonial Empire. It is fairly certain that some of the authors of the Reports under review may at times experience feelings of slight resentment at the abbreviated notices which certain aspects of their work have received for to them it may appear that the importance of specific investigations for which they were responsible justly merits more extended reference than has been accorded them. It must however be understood that summary references do not imply lack of appreciation. Limits of space must be rigorously observed, while special studies are more exhaustively summarized elsewhere.

The task of deciding what items shall be selected or how extensively or restricted their description shall be is no mean responsibility for any single person. For consider the task as a whole.

These annual studies present at first sight a certain uniformity characterized by their subject matter which follows the plan outlined in the *Model Medical and Sanitary Report*. But similarity begins and ends there for the contents discuss a complex variety of conditions of climate food physique custom and other factors influencing the lives of upwards of fifty millions of people comprising races ranging from the semi primitive to the civilized and inhabiting territories lying between the Falkland Islands at the toe of South America and Hong Kong in the China Seas, and from Gibraltar to the remote South Pacific. It is consequently through a bewildering series of sanitary experiences as varied as the contents of the witches cauldron in *Macbeth* that the

summariast is required to drive his way with prodigious slowness in attempt to condense the detailed accounts of the small army of indefatigable writers of these Reports. On many occasions the present writer has realized with disconcerting vividness how imperfect a notion of each of these Reports he has succeeded in presenting.

While disclaiming any intention or desire to select examples from these Reports for the purpose of indulging in expressions of praise or criticism it will be clear that the study of so varied a documentation must have stimulated thought in many directions. It may not be lacking in interest therefore if the present opportunity is used for the purpose of referring briefly and in the most general terms to certain methods employed, or disregarded, and to certain aspects of public health work as described by the reporting officers in the documents under review.

For example some of the Reports give little information concerning matters which should certainly be regarded as fundamental requirements if Public Health Work is to be effectively and efficiently carried out. Cases occur where a reporting officer observes, "No population figures are available" or that the only population data available are those resulting from an enumeration as remote as that of 1921 - annual estimates having been attempted. Such misleading figures have actually been applied year by year for the assessment of various rates.

It is equally surprising to find sometimes under otherwise well-ordered administration and in territories which have long been peaceful and stable that vital registration systems still remain an unrealized ambition and responsible authorities appear to be little concerned with establishing and applying this scientific instrument fundamental to the successful achievement of all public health undertakings.

The writer realizes that not infrequently local conditions and circumstances may combine to render census work unusually difficult problems of organization will be so complicated by the customs, beliefs and habits of the races concerned and by a variety of other factors as to render the task on occasion well-nigh impossible. Difficulties of no mean order also have to be encountered when attempts are made to establish vital registration systems, for such systems cannot be brought into being and made to function efficiently merely by the promulgation of a series of nicely-worded legislative enactments. To officers so placed he offers not criticism but sympathy. But enumeration and registration difficulties are not solely responsible for all, or even a large proportion of the omissions noted in some of the Reports under review.

Here and there appear vague hypotheses concerning supposed disease prevalence but no declared intention to replace mere medical conjecture by the indisputable evidence supplied by established fact. The careless use of comparative figures is frequently met with, numerical statements relating to hospital experience, or to the incidence of specific diseases are at variance in different sections of the same Report, while nomenclatures used for the classification of causes of sickness and death vary widely and constitute a serious obstacle to attempts made towards comparing experience between Colony and Colony.

These are some of the more outstanding shortcomings noted in the course of this survey of Colonial Medical Reports for the year 1934.

and though in a short introductory essay it will be quite impossible to discuss matters at length brief comment concerning some of them may not be inappropriate.

First with regard to population figures. It is true that the census operation may appear to some as nothing more than a useless official inquisition and not the invaluable means of human stocktaking and fundamental instrument of Government and Public Health Administration it most certainly is. In the field of public health it is of especial importance, for it is clear that without precise knowledge of the human units comprising a community all other collected facts lose much of their significance. Some prefer to refuse recognition of certain aspects of work which do not happen to appeal to them. Yet the practice of turning a blind eye upon necessary duties or of refusing to employ tools especially designed for the more efficient performance of specific tasks is dangerous. Public Health authorities cannot afford to disregard the census instrument. For only by its use are dependable and precise notions of the numbers composition and distribution of a people made known and intercensal estimates of population made possible. These data are not only necessary for the calculation of the important annual birth and death rates but they are indispensable to all sound investigations designed to measure and trace trends and tendencies contributing to population progress or decay and for the determination of the effects or defects which follow the application of various measures designed to bring about sanitary improvements.

Then again since census enquiries are carried out only at infrequent intervals such operations need to be supplemented by systems in constant operation for the regular collection of certain prescribed facts which need to be studied by public health authorities both as they occur and as records of past events. In other words registration is necessary for the assembly of facts calculated to throw light upon the physiological and economic aspects of births race fertility diseases deaths and other items of importance which provide bases for investigation and remedy in all well-ordered public health schemes. Changes in the direction and rate of population trend as influenced by births migration deaths economic circumstances or other factors will demand changes—possibly such startling changes as may revolutionize existing schemes of work—in the organization of public health administrations if progress is to be made.

In some of the Reports there occurs a tiresome repetition of phrases of unscientific flavour dismissing important matters concerning disease prevalence and incidence by such conjectural expressions as "very prevalent widespread frequently met with" it is not believed that numerous cases of and so on carrying a disturbing vagueness lacking the essentials of epidemiological significance. And yet it would seem that disease experiences lend themselves to the minutest accuracy of measurement. There is nothing wrong with the scientific instrument devised by man to keep track of morbid conditions but results are unobtainable if workers fail to use the instrument.

Where quantitative data are quoted they should be accurate and where reference is made to similar groups of numerical facts in different sections of the same Report steps should be taken to ensure that they are in agreement. These requirements are by no means not always met.

With regard to the question of nomenclature, the present lack of uniformity is to be deplored as constituting an obstacle to the establishment of inter-Colonial comparisons of data, or to the furtherance of epidemiological studies. It is true that while uniformity of practice simplifies work it can be dull—but in the field of public health it is indispensable and in use does not necessarily rob the medical explorer's life of the outstanding charms of incentive, rest, and enterprise.

It is submitted that sound judgments in the field of public health work whether in the Colonies or elsewhere, can be reached only by careful reflection and reasoning on the basis of accurately recorded facts. Yet the doubtful and incomplete records relating to some Colonial territories lead the authors of official reports to proclaim that in no circumstances may the data at their disposal be accepted as guides to the state of the native population, while owing to their lack it becomes impossible to estimate the effects upon the native health of measures applied for the prevention, relief, or cure of disease, for the removal of insanitary conditions, or the introduction of other civilizing influences.

Facts are stubborn things and often seem dull, yet they are the seeds of imaginative ideas which the wit of man is often able to transmute into practical realities. They carry a particular significance in the important field of medical opportunity represented by the widely scattered British Colonial Possessions.

There, medical officers are engaged in their own particular schemes of scientific cultivation—day by day they are handling a precious wealth of knowledge, yet the heaped up treasures resulting from their experience and effort—and contained in their annual reports, are apt to be disregarded or over looked—and printed waste is thus allowed to accumulate. By the zealous activity of the many Colonial Medical Officers in various parts of the Colonial Empire this state of affairs could be remedied—annual reports would become more attractively readable and scientifically dependable—and of such studies it would then be said in the significant words of Bacon, “waste men not time.”

MEDICAL AND SANITARY REPORTS FROM BRITISH COLONIES, PROTECTORATES AND DEPENDENCIES FOR THE YEAR 1934.

[SIXTH ANNUAL ISSUE]

Summarized by P GRANVILLE EDGE

WEST AFRICA

COLONY AND PROTECTORATE OF NIGERIA (1934)

The Colony and Protectorate of Nigeria is the largest of the British West African possessions its approximate area including the area of the Cameroons under British Mandate, being 372 674 sq miles or more than three times that of the United Kingdom. It is bounded on the west and north by French territories on the north-east by Lake Chad on the east by the Cameroons and on the south by the Gulf of Guinea.

Vital Statistics —The data are meagre registration of births and deaths is compulsory only in the Lagos area while the only non European population figures available appear to be those resulting from the 1931 enumeration viz. 19,928,171

For the Lagos area (Lagos and Ebute Metta) the estimated population for the year under review was 160 000 (155 664)† 4 463 (3,883) births and 2 088 (2 156) deaths being recorded the resulting births and deaths rate being 27.9 (24.9) and 13.1 (13.8) per 1 000 respectively The distribution of total births was Lagos 3 417 (3 030) Ebute Metta 1 046 (852) and of deaths Lagos 1 703 (1 778) Ebute Metta 385 (377) Infant deaths numbered 532 (533) giving an infant mortality rate of 119.2 (137.3) per 1 000 registered births 425 (435) of the infant deaths occurred in Lagos and 107 (98) in Ebute Metta, the infant mortality rates being 124.3 (143.5) and 102.3 (115.0) respectively

The estimated European population at the end of the year was returned as 5 021 (4 729) and within this group 30 (30) deaths occurred during the year

Of European officials the total number resident was 2,107 (2,095) with an average number resident of 1,508 (1,536). Of these 100 (100) were invalided and 8 (5) died. Principal causes of invaliding were neurasthenia 20 (23) asthenia 12 (—) and malaria 10 (7) and of deaths one each due to cerebral malaria blackwater fever diphtheria, coronary thrombosis V D H myocarditis lobar pneumonia and septic pharyngitis.

Invalidings and deaths of African officials numbered 43 (61) and 29 (36) respectively Principal causes of invaliding were phthisis 11 (2) diseases of the heart 9 eye diseases 6 Of the recorded deaths 6 (7) were ascribed to lobar pneumonia and 4 to smallpox.

The average daily strength of the Nigeria Regiment R.W.A.F.F was 3,094 (3,079) 50 (66) were invalided and 24 (20) died the death rate being 7.75 (8.4) per 1 000 The average daily strength of the Police Force was 3,548 (3,564) 33 (35) were invalided and 32 (33) died, giving a death rate of 9.0 (9.2) per 1 000

† The second number in brackets, refers throughout the Supplement to the figures for the preceding year which are given for comparison.

Available data are summarized as follows —

Item	Europeans and Whites		Other Non-Natives and Africans	
	Whole of Nigeria	Lagos Area	Whole of Nigeria	Lagos Area
Estimated Population	4,130	1,089	19,928,171 (Census 1931)	160,000 (153,000)
Live Births	36 (42)	12 (11)	—	4,463 (3,883)
Rate per 1,000 Population	8.7 (10.2)	11.2 (10.3)	—	27.4 (24.5)
Stillbirths	—	—	—	115 (118)
Deaths	32 (44)	9 (15)	—	2,068 (2,159)
Rate per 1,000 Population	7.7 (8.0)	8.4 (8.2)	—	13.1 (13.6)

The Report also contains an excellent Table setting out the 1,000 deaths in the Lagos area by sex at ages, for all causes and for seven selected causes. Another equally useful Table presents recorded deaths by sex and by months of occurrence for (a) Europeans and Whites for the whole of Nigeria, and (b) other non-natives and Africans in the Lagos area.

Maternity and Child Welfare.—Of candidates under training as Midwives, 5 (7) were awarded Grade I certificates of proficiency and 5 (6) in Grade II (see also this *Bulletin* 1935 Supp., p. 5).

During the year 518 (463) normal pregnancies, 83 (77) cases of abnormal labour and 133 (141) ante-natal cases were admitted to the wards of the Maternity Hospital Lagos, and 1,890 women attended the ante-natal clinics. At the child welfare centres established in Lagos and Ebute Metta, 6,841 (7,395) attendances were recorded. The African Health Visitors employed by the Lagos Town Council, and working under the control of the Medical Officer of Health and a European Nursing Sister made 33,715 house visits during the year.

The new Maternity Hospital at Aba was opened towards the end of the year and that at Calabar also completed and opened for out-patients and child welfare work. At the Aba Clinic 1,289 (1,212) cases and 8,823 (8,713) attendances were recorded. At Ijebu Ode 196 (125) women were admitted to the Maternity Ward of the General Hospital and attendances at the Child Welfare Clinic totalled 2,801 (1,339). A baby show held at the town proved remarkably successful. At Abeokuta Akure and at Victoria and Buea in the Cameroons, child welfare centres are increasingly popular and carrying on useful work. The examination of 900 infants at Kumba in the Cameroons indicated widespread malnutrition among children of the farming classes. The Maternity Hospital built at Ilorin in the Northern Provinces was opened in April. Forty-seven labours were conducted and 728 infant welfare attendances recorded—a most promising start in a Mohammedan and Pagan area. The female section of the Kano Hospital has been

extended ante-natal and maternity work are steadily increasing. While Hausa women will not attend the female section of the Katsina Hospital, they are becoming more and more willing to take their children by encouraging this inclination and by house visiting it is hoped ante-natal and maternity work may be extended.

Maternal mortality in childbirth and infant mortality are exceedingly high largely due to ignorance widespread use of native drugs and unskilful manipulative methods. Dr T. STARVOG, a Medical Officer stationed in the Southern Provinces supplies interesting comments upon the problem and concludes with the opinion "With increased education and the passing of the old generation much improvement may be expected to follow. Increasing ante-natal care should do much to ameliorate the wholesale use of native drugs and thus save in this Province alone hundreds of maternal lives."

School Hygiene—In Lagos school medical inspection was to some extent interrupted owing to the absence on leave of the Lady Medical Officer in-Charge the school clinic was open daily 2,680 new cases and a total attendance of 19,652 were recorded. In the Oyo and Abeokuta Provinces also systematic inspection of school children was curtailed, for Medical Officers were busily occupied dealing with extensive epidemics of smallpox.

In Calabar Province, a survey devoting special attention to diet and deficiency diseases was carried out. The general clinical impression formed following the examination of 1,000 children was that malnutrition was not markedly common. At Port Harcourt a definite improvement in development and bodily cleanliness was noted among 320 children examined.

Labour—There is little to add to the description previously supplied (see this *Bulletin* 1935 Supp p 6*). There is no contract or indentured labour in Nigeria. In the Northern Provinces three Sanitary Superintendents are employed wholly or partially on the inspection of mining camps and with the co-operation of owners and managers have been able to bring about considerable improvements especially in the tin areas of the Bauchi Plateau.

Public Health Sanitation etc—The year opened with no improvement in the financial position and it was again necessary to exercise economy in all branches of medical work vacancies in European personnel except in a few instances were not filled, and the cadre is considerably reduced.

Attention is increasingly being directed upon the dietetic deficiencies of native foodstuffs the effects of which appear particularly among school children. In an article contributed to the *West African Medical Journal* Dr Fitzgerald MOORE directed attention to the toxic effect of stale or badly prepared cassava, while Dr A. CLARK is working in Nigeria upon the tox albumen (tannin) of the coco yam, this investigation being financed by the Medical Research Council and the Colonial Medical Fund. Work upon the values of native foods has continued to be carried on at the dietetic laboratory—removed from Katsina to more spacious accommodation at Zaria.

The incidence of neurasthenia among European residents calls for attention. During 1934 the condition was diagnosed in 104 cases and was the cause of invaliding in 20 per cent. of cases relating to European officers.

As regards *sewage disposal* in Lagos, great progress has been made with the water carriage system introduced by the Director of Public Works in 1932. Elsewhere while little advance can be reported, existing standards have at least been maintained. At the barracks of the R.W.A.F.F. at Enugu three large trough water-closets with adjacent septic tanks were constructed to serve a camp population of about 1,000 persons. A water carriage system has been installed at the European and African hospitals at Kaduna and in a few private houses at Kano.

Scavenging and refuse disposal arrangements continue along the lines previously described (see this *Bulletin* 1934 Supp. p. 6* and 1933, Supp. p. 6*) Progress with *drenage* schemes has been slow but continues gradually and steadily.

With regard to *water supplies*, the water delivered to various towns (see this *Bulletin* 1933 Supp. p. 6*) during the year maintained a high standard of purity. Hydrated lime has replaced soda ash in the chemical treatment of water with satisfactory results, among the latter a reduction in the cost of treatment.

Housing and Town Planning schemes are receiving considerable attention. Public Health and Townships Ordinances being enforced, insanitary sites cleared and other improvements effected.

Food was plentiful and cheap though too often offered for sale in markets which are primitive and insanitary. Efforts are being made to remedy this defect and with the aid of grants from the Colonial Development Fund model market stalls have been erected in a number of native administration areas.

Following the meeting of the Southern Provinces Dietetics Committee at Enugu early in the year the Education Department collected data on the age height weight and physical condition of children in a large number of schools these data will be analysed by the Medical Officer in charge of Dietetics Research. Copies of an approved dietary have been issued to the Managers of all schools. An examination of Kaduna school children indicated that approximately 50 per cent. of them were below normal in nutrition and physique. On the other hand examination of children of certain of the Pagan tribes of the Bauchi Plateau showed 70-80 per cent. normal as regards nutrition and physique. These interesting differences are attributed to the fact the Pagans are less scrupulous as to their sources of protein, take large quantities of green food and a good deal of beniseed, which contains a useful protein and is a valuable source of mineral salts.

A considerable number of the boys at the Salvation Army Boys Industrial Home, Yaba, showed symptoms suggesting errors or deficiencies in diet. A properly balanced dietary was prepared by the Assistant Medical Officer of Health, Lagos, and following its adoption earlier signs disappeared.

Training of Sanitary Personnel continued (see this *Bulletin*, 1933 Supp. p. 7). A serious epidemic of smallpox interfered with systematic instruction at Ibandan, but as the pupils were employed on vaccination duties, they gained valuable experience. Organization and equipment of the Umuahia centre are not yet complete—training will follow the lines of the Ibandan centre. The new school building at Kano for both Government and Native Administration Sanitary Inspectors, was opened early in the year.

Hospitals Dispensaries Clinical Returns etc—Owing to financial restrictions little extension of hospital buildings has been possible though some Native Administrations in the Northern Provinces were able to release reserve funds for this purpose. Thus a new female ward is being built at Katsina a laboratory and medical store have been erected at Maiduguri and electric light installed in the hospital a new hospital at Hadejia approaches completion an out patient block and operation theatre have been built at Gusau the dispensary at Idah has been enlarged and converted into a small hospital and, at Kano a new female ward has been built For the numbers distribution and types of hospitals maintained see this *Bulletin* 1935 Supp p 7 *

At the European hospitals in patient cases numbered 1 043 (1 034) and out patients 4 671 (3 882) These figures are not in agreement with those appearing elsewhere in the Report viz 1 065 and 6 968 respectively

In the African hospitals in the Northern Provinces 19 485 (19,581) in-patients and 128,017 (133,561) out patients received treatment while in African hospitals in the Southern Provinces in patients numbered 28 179 (22 620) and out patients 485 534 (443 190) The total cases treated in African hospitals in the Northern and Southern Provinces together were in-patients 47 664 and out patients 613 551 and here again discrepancies may be noted for in another section of the Report the figures are returned as 47,947 and 594 555 respectively

During the year under review there were 231 (222) dispensaries open 98 (96) of these being situated in the Northern and 135 (122) in the Southern Provinces The medical supervision of the dispensaries was difficult owing to shortage of medical staff At these centres a total of 628,063 (819 188) cases received treatment and of the total 446 425 (388,931) were treated at dispensaries in the Southern Provinces The principal ailments recorded were *ulcers* 78 706 (63,396) cases *helminthiasis* 52 032 (47 186) *chronic rheumatism* 55,230 (45 718) *scabies (crew crew)* 48,596 (34 173) *malaria* 45 098 (34,922) *wounds and injuries* 39,803 (32,855)

Superintendents of Missions report that during 1934 there were 66 (74) mission stations performing medical work in the Northern Provinces and 95 (41) in the Southern Provinces at the former 75 473 (56 696) cases were treated and 586,580 (781 125) attendances and at the latter 111,316 (57,588) cases and 315 703 (229,957) attendances were recorded.

As regards *Mental Asylums* the position is still very unsatisfactory the small cure asylums at Yaba and Calabar are filled to their utmost capacity and it has been found necessary to declare prisons wards in certain prisons as lunatic asylums in order that cases may be accommodated. *Malaria* cases treated in hospitals were as follows —

Europeans 1 025 (928) of which 262 were in patients subtertian infections predominated with 1 018 (928) cases and of these 249 (267) occurred among in-patients and were responsible for the two deaths recorded. Among non-Europeans 35 488 (34,594) cases received treatment, and of these 2 183 (1 881) were in patients subtertian cases totalled 35,272 of which 2 148 (1,879) were in-patient cases. 52 (36) deaths were recorded.

There were 16 (12) cases of *blackwater fever* among Europeans with unusually high mortality one official and four non-officials dying of

the disease. Among Africans and non-Europeans 20 (17) cases with 3 (4) deaths were recorded.

General anti-malarial measures were carried out as in previous year.

Yellow Fever—An outbreak of yellow fever occurred in the Katsina Province in November and December. During these months an exceptionally large number of immigrants from French West Africa crossed the northern border and it is possible the infection was introduced from that direction as yellow fever was known to be prevalent at Zinder and other northern areas between August and October. Six proved cases one of which was fatal, occurred among Europeans. Six African fever cases were suspected, two gave positive protection test one indefinite results and the remaining three were negative. The usual action as regards control etc. in the infected area was taken. Severe harmattan continued throughout the period and by markedly reducing the number of mosquitoes no doubt cut short the outbreak. No yellow fever was reported in the Southern Provinces. Smallpox occurred in epidemic form in the Northern Provinces, in the Katsina and Sokoto Provinces in the Katagum division of the Bauchi Province, in the Benue and in numerous smaller outbreaks throughout the country. Reported cases numbered 8,327 and 2,153 deaths were recorded. A successful vaccination campaign was carried out, for while adult Hausas strongly object to being vaccinated themselves, they have no objection to their children being done. Attention was mainly confined to children under 16 and it is hoped that the child population will shortly become completely immunized. Altogether 232,453 (195,977) vaccinations were performed.

In the Southern Provinces 2,062 (1,494) cases with 385 (234) deaths were notified. In the Owo Province the disease was widespread throughout the area in Ijebu Province 496 cases with 130 deaths were recorded, and in Lagos 122 (59) cases with 20 (10) deaths. An intensive and systematic vaccination campaign was embarked upon, and 1,005,835 (489,845) were performed, 81.6 per cent of which were successful.

No case of plague either human or rodent was reported during the year. Anti-plague measures continued to be carried out as heretofore systematic fumigation trapping and examination of rodents continued, but no plague-infected rat was discovered. No case of relapsing fever or human rabies was reported. Canine rabies appears to be on the increase and many outbreaks were reported. 111 non-European persons received prophylactic treatment, the biting animals (8 dogs, 2 cats) proving positive.

Cerebrospinal fever was responsible for 15 cases with 11 deaths—all occurring among Africans and non-Europeans, while two European cases of diphtheria one of which was fatal, were recorded. Fevers of the enteric group are seldom or never reported in epidemic form in Nigeria though each year sporadic cases are notified. During the year under review 13 (15) cases occurred among Europeans, 9 (11) of these being *Bac. typhosum* infections one (1) *Bac. paratyphosum A* and 3 (2) were undefined. One (4) fatal case was recorded. Among Africans and non-Europeans, 28 (25) cases were reported, differentiating as to 17 (13) *Bac. typhosum* ? (3) *Bac. typhosum A* and 4 (7) undefined. 7 (6) deaths were recorded.

European cases treated in hospital for dysentery numbered 48 (48) and out patients 61 (73). Of the 109 (121) cases treated 66 (82) were amoebic, 14 (33) bacillary and 29 (8) were undefined. No deaths were recorded. Among Africans and non Europeans a total of 4,313 (4,680) cases occurred, 3,154 (3,591) of these relating to out patients. Of the total cases 2,934 (3,592) were amoebic 54 (116) bacillary and 1,325 undefined. 128 deaths were recorded 92 being ascribed to the amoebic type of the disease.

Owing to the lack of reliable vital statistics there is little information available about the incidence of tuberculosis except in Lagos, where all deaths are medically certified. In Lagos 185 (149) deaths were ascribed to this cause in 1934 and of these 141 (124) were due to phthisis. For Nigeria as a whole the statistical returns record 4 cases of pulmonary tuberculosis among Europeans and among Africans and non Europeans 1,313 cases of all forms of tuberculosis of which 906 were pulmonary. No European deaths were recorded but among Africans and non Europeans 178 out of a total of 191 tuberculosis deaths were due to the pulmonary form of the disease. The pneumonias especially broncho-pneumonia continue to take a heavy toll especially of infant lives. According to the statistical returns 2,412 cases of pneumonia received treatment at non-European hospitals and institutions 1,689 as in-patients there were 515 in patient and 262 out patient cases of broncho-pneumonia.

Trypanosomiasis.—Cases treated at hospitals and dispensaries numbered 4,616 (in the text of the Report the figure is 4,613) with 108 deaths of the total cases recorded three related to Europeans.

Dr H. M. O. LESTER, Deputy Director of Tsetse Investigation supplies an admirable report which discusses at length the year's work and outlines the future conduct of the campaign against sleeping sickness this contribution, which appears as an Appendix to the General Report should be read in its entirety for nothing more than the briefest summary can be presented in these pages.

Attention is called to matters of reorganization necessitated by demands consequent upon changing conditions and the growing needs of the service. The Headquarters Office was moved from Gadau to Kaduna as the inaccessibility of the site of the former station made co-ordination of the various field activities and co-operation with the administration matters of increasing difficulty. Six fully equipped sleeping sickness survey teams were at work throughout the year during which time they examined 381,712 persons (elsewhere in the Report the figures are given as 831,712) and discovered 43,017 cases of trypanosomiasis. The system of surveys and mass treatment have yielded excellent results (see this *Bulletin* 1935 Supp p 10*).

The research side of the work has had to suffer curtailment owing to financial restrictions but much useful work continues to be carried on. The trypanocidal properties of various new chemical compounds continued to provide subjects of experiment and test (see this *Bulletin* 1935 Vol. 32 p 685 and 1935 Supp p 10*). One of these a complex aromatic arsenical compound, S 107 prepared under the auspices of the Chemotherapy Committee of the Medical Research Council gave distinctly promising results. These investigations continue. An attempt was made to investigate the effect of exposing preimmunized cattle to the attack of wild *G. submorsitans* by utilizing the cattle

survivors from various mixed infection treatment experiments. Two months after the first exposure to *G. morsitans* six out of the six preimmunized cattle had died—the cattle lost condition rapidly without trypanosomes becoming numerous in the blood, suggesting that the state of preimmunity though sufficient to modify the infection was insufficient to prevent the mortality. Another experiment which still continues aims at the determination of what effect, if any injection of a dose of *T. evansi* has had on cattle which had been infected with the trypanosome some two years previously.

Entomological research work has continued. Frequent censuses of the tsetse population suggest that at the beginning of the rains the population of *G. morsitans* starts to increase reaching its maximum by the end of the wet season, a decline in numbers setting in soon after the commencement of the dry season. These results are in general agreement with findings of other observers in East Africa, and suggest that anti-tsetse measures might meet with greater success if applied early in the dry season when the fly community is entering upon an unattractive season and decreasing naturally. Dr. VASEY published the results of an experiment upon the longevity of tsetse under the title of "The Effect of High Maximum Temperature upon the Longevity of *Glossina submorsitans*, Newst. and *Glossina fuscipes*, Westw." (Bell, Ent. Research 1935 vol. 26 pp. 103-113).

Helmintic Disease of one sort or another is widespread throughout the country. According to the Native Dispensary Returns, Tercaria, *Dracunculus*, *Ancylostomiasis* and *Schistosomiasis* were more common in the Northern than in the Southern Provinces, in the latter areas predominating. Cases treated in native hospitals were *Dracunculus* 23,072, *tercaria* 8,731, *ancylostomiasis* 2,660, *dracunculiasis* 2,571, and *schistosomiasis* 623. The opinion is expressed that until both public and personal hygiene have advanced far beyond their present stage, no serious abatement of these infestations can be expected. During the year only 4 cases of *schistosomiasis* appear to have been treated at native dispensaries in the Southern Provinces, yet during the course of a special investigation in the Okrika area of the Owerri District (Southern Provinces) out of 300 persons examined, including 150 school children ova of *S. haematobium* were present in 30 per cent., and clinical signs of schistosomiasis in 52 per cent. of persons examined.

General Diseases.—At non-European hospitals, 13,439 (16.5%) and of syphilis and 16,563 (15.180) of gonorrhoea received treatment, 2,578 (2,254) of the former and 1,360 (1,583) of the latter being in patient cases. In addition to the foregoing, 23,684 (19,349) cases of syphilis and 16,717 (14,160) cases of gonorrhoea were treated at native dispensaries.

European cases were syphilis 33, gonorrhoea 88.

No less than 119,728 (86,743) cases of leprosy were treated at Government institutions and 22,230 (107,720) at native dispensary centres during the year. The way-side clinic method of treatment by skin-injections has proved a striking success (see this Bulletin 1935, Sept., p. 11). In the Bamenda district 77 (41) trained men are at work, and at Banso 19 (5).

Leprosy.—The average leper population under treatment at leper settlements was 4,767 as compared with 4,880 in the previous year. The figures relating to the distribution of leper patients amongst the

various treatment centres suggest that total treatments numbered 4,667 (not 4,767) for it is noted 2,909 cases were treated in the Southern, and 1,758 in the Northern Provinces of the former 1,909 and of the latter 839 patients received treatment at Medical Mission Centres. At non European hospitals in-patient cases numbered 380 (375) and 2,493 (2,593) as out patients while 1,821 (1,827) cases were treated at Native Administration Dispensaries.

Scientific—The investigation of malignant disease among natives was continued. 500 tumours were examined. The results suggested that (a) carcinoma and sarcoma are of relatively equal frequency, that (b) malignant tumours of the skin are common and that (c) the distribution and age incidence show some striking variations with European experience.

Of 1,750 Schick tests carried out on natives approximately 30 per cent. of those examined during the first year of life were Schick positive. For ages up to 10 years about 20 per cent. are susceptible and thence forward almost complete immunity seems to prevail, the high rate of immunes being ascribed to natural immunization by sub-clinical infection.

As sporadic cases of sickle-cell anaemia continue to occur a survey among natives is suggested with a view to determining the percentage with the sickle-cell trait even though they may not necessarily display any symptoms of the condition.

Routine laboratory work included the examination of 5,068 blood specimens and of these 1,038 showed *P. falciparum*, 51 *P. malariae* no *P. vivax*. Among 4,562 (4,558) faecal examinations 2,738 (2,821) contained ascaris ova, 2,585 (2,420) trichuris 1,633 (1,553) ankylostome. The ova of *S. haemobium* were present in 173 out of 3,285 specimens of urine examined. Other work included the examination of 94 brains (84 dogs, 9 cats, 1 human) and of these 41 were positive for rabies (39 dogs, 2 cats), one dog's brain was negative on histological examination but proved positive on animal inoculation.

During the year the following papers were published by members of the Staff of the Laboratory Service—

- SMITH E. C. Post-mortem report on a case of sickle-cell anaemia.—*Trans Roy Soc Trop Med* 1934 Vol. 28 pp 209-214
 —— Filtration experiments with *Spirochaeta schaudinni*—*Jl Hygiene* 1934 Vol. 34 pp 429-432.
 CAUCHI J. & SMITH E. C. An Analysis of 1,758 Schick tests in Nigerian natives.—*Lancet* 1934 Vol. 2. XXV p 1393
 SMITH E. C. & ELMES B G T. Malignant disease in Natives of Nigeria. An analysis of 500 tumours. *Ann Trop Med & Parasitology* 1934 Vol. 28 pp 461-476

With regard to research work carried out by the sleeping sickness service in addition to the published paper by the Government Entomologist (see above under trypanosomiasis) the following paper was published—

- MARSHALL R. S. LESTER, H M O & JONES A. G F. Some experience with Potassium Antimonyl Tartrate in the treatment of Bovine Trypanosomiasis in Nigeria. *Jl Comp Path & Therap* 1935 Vol. 48 pp 58-67

The Report of the Dietetics Research Laboratory provides a further Appendix to the Annual Medical Report under review some mention

completed training during the year and secured the Midwives Board Certificate. Deliveries on district by qualified midwives in Accra and environs numbered 507 (303) and in all areas where nurse-midwives and subsidized midwives were employed, deliveries numbered 1,108.

At British Red Cross Centres 20,328 (18,977) children and 744 (5,318) expectant mothers attended the Clinics. The Gold Coast Central Council Branch of the British Red Cross Society also give valuable help in the form of voluntary and salaried workers in connection with domiciliary visiting and baby-weighting in various places.

At the three Roman Catholic Mission welfare centres the attendances of 49,413 children were recorded. No data are available in respect of the welfare work of the English Church Mission at Mampong.

In patients dealt with at the Princess Marie Louise Hospital and Welfare Centre at Accra numbered 501 (635) and at the Kumasi Centre 638 (515).

School Hygiene—Shortage of Staff again precluded anything in the nature of a regular school medical service (see also this Bulletin 1933, Supp. p. 15*) but medical officers devoted what time they could to the inspection of school premises and routine inspections of students. Upwards of 4,000 school children were examined in four stations, 20 per cent of them showing enlarged spleens. In accordance with usual experience the percentage of splenomegaly declined with increase in age. Hygiene forms part of the curriculum of all schools and the close co-operation existing between the Department of Education and the Medical Department ensures that the teaching of this important subject receives careful attention. "Health Days" held from time to time served to emphasize the importance of the practical application of school instruction to the hygiene of home and town.

Public Health Sanitation etc.—Dr Duff reports that compared with previous experience the general health of the African community during 1934 was not unsatisfactory, no serious or widespread epidemic occurred during the year. At the same time it is observed that such diseases as malaria, yaws, dysentery etc., are factors adversely affecting the general welfare of the people and must be combated by the provision of additional social services and extension of educational programmes when the financial situation permits the introduction of these necessary improvements. Deficiency diseases do not figure largely in the mortality and morbidity returns neither do the majority of the inhabitants appear under-nourished, yet reports from medical officers in different areas suggest that deficient and monotonous diets are responsible for low standards of health and reduced resistance to disease, especially among children. Improved farming methods and instruction in the relative food values of various crops are matters demanding attention.

The important question of water-supplies continued to receive the attention of the authorities—advice and assistance were given in areas where chiefs and people were prepared to exert themselves to an endeavour to improve their supplies, while here and there native chieftaincy were persuaded to incur expenditure for this purpose. Shortages of potable water in some parts of the Northern Territories gives rise to hardship and investigations are proceeding with a view to seeking possible sources of supply to meet these difficulties.

Koforidua, with a potential supply at hand, continued to derive its main supply from a polluted source and Saltpond from rain-water

tanks and brackish wells. Funds are urgently necessary to rectify these conditions.

Methods of sewage disposal remained for all practical purposes as previously described (see this *Bulletin* 1935 Supp. p. 15*) At the Accra European Hospital the pan system is to be replaced by a water carriage unit with septic tanks and aeration beds. In the absence of funds for a public sewerage scheme water-carriage systems for private residences are becoming increasingly popular. Sanitary conditions in rural areas of Ashanti are reported to have deteriorated and in the Northern Territories—outside the main centres—promiscuous fouling of the ground round habitations was reported to be general. A Townships Ordinance will be enacted to deal with these and other insanitary practices. The system of refuse disposal remained unchanged, though the functioning of services in some areas was not satisfactory. It is curious to note that though stress is laid upon the importance of increased educational facilities the spread of education leads in some cases to weakening the feudal control of the chiefs and consequent political instability in some areas these developments in their turn reacting in some measure upon such matters as incinerator services.

Under the heading of drainage apart from the construction and maintenance of large numbers of anti-malarial earth drains here and there there is little to report. The importance of clearing bush and under growth round villages water-supplies river crossings etc. with the object *inter alia* of reducing the danger from *tsutsu* was again emphasized and good work was accomplished in the Protectorate and in the Northern Section of the British Sphere of Togoland. On the other hand, clearing round villages suffered to no small extent in Ashanti because of lack of funds for this work. Also in townships where Government and Municipal labour was employed, controlled farming took the place of extensive clearings formerly possible in more prosperous times.

Food—The inspection of fresh food, live-stock and tinned food forms part of the duties of health officers and their staffs who also carry out periodical inspections of aerated water factories, bakeries, restaurants, etc. No new markets were constructed during the year but a new slaughter house was erected at Somanya and plans were prepared for new structures in three other areas. The comparatively recent discovery that red palm oil was a valuable source of vitamin A is of considerable local interest. The relationship established by Professor Szent-Györgyi between ascorbic acid and vitamin C is of great practical importance since red peppers of the genus *capsicum* are obtainable throughout the Gold Coast and are a popular article of diet even in very young children.

Port Health Work—No Gold Coast port was placed in quarantine during the year. Efforts of Health Authorities of the Ports are directed towards rendering the terrain unsuitable for the introduction of dangerous infections rather than to relying strictly upon ship quarantine. During the year discussions took place on the question of the abolition of Consular visas on bills of health and of bills of health themselves the conclusion reached was that with the highly developed system of international exchange of information on health matters through the medium of various agencies and with Masters under obligation to give all necessary information regarding their ships, the need for bills of health has passed and their abolition may soon be realized.

Labour Conditions Sanitation in Mines Areas etc.—Increased activity in the mining industry combined with economic stress in French Territory resulted in a considerable influx of immigrants. 35,717 immigrant labourers were dealt with at the Kumasi disengagement station during the year. The resistance of this class of labourer to pulmonary tuberculosis is nil, and the proportion of deaths from this disease to deaths due to all causes in a mining community is high. In many instances the standard of sanitation in and around mines is regrettably low but progress can be recorded. There has developed a more satisfactory spirit of co-operation between mine administration and officers of the Health Department. Opposition to suggestions for improvement was rarely met with, and more often managers undertook reformatory schemes involving considerable expense in their entirety to put matters right. In many instances civil townships have grown up in close proximity to mines often with little or no planning or control. Efforts are being made to remedy existing conditions.

Measures taken to spread the knowledge of Hygiene and Sanitation—The training school for Sanitary Inspectors was re-opened in Accra during the year. A higher standard of education is being demanded from candidates for posts in the Health Branch. Health visitors continue to be trained partly by Medical Officers in charge of Welfare Centres by Health Sisters and by Medical Officers of Health of the districts concerned. In addition to the preventive teaching carried out at welfare and other centres public lectures on health topics were delivered to the general public, to tribunal registrars, church school teachers and scholars. A public health museum has been established in Accra. The Gold Coast Central Council Branch of the British Red Cross Society and the Gold Coast League for Maternal and Child Welfare have done admirable work in connection with public health education among other activities they undertook the responsibility of printing and distributing large numbers of popular pamphlets dealing with a variety of factors influencing the health of the community.

Hospitals Dispensaries Clinical Returns etc.—Appendix I to the Annual Report supplies details of hospitals and dispensaries established in Gold Coast Colony the following table presents a summary of the relevant particulars —

Area	European Hospitals		African Hospitals			Days per week
	No.	Beds	No.	Beds	Cots	
Eastern Provinces	1	18	11	363	71	13
Central	2	10	5	123	8	7
Western	2	29	4	90	4	4
Ashanti	1	11	4	177	30	8
Northern Territories	1	6	6	105	2	3
British Togoland	—	—	2	36	—	—
Totals	7	74	32	834	108	44

The figures differ little from those of the previous year (see this *Bulletin* 1935 Supp p 16*) A new hospital was built at Keta (Eastern Province) during the year replacing the old building which had been destroyed by encroachment of the sea. In addition to the above hospital accommodation there are 10 contagious diseases hospitals one for Europeans with 4 beds and nine for Africans with bed accommodation for 92 patients.

Total cases treated at all hospitals numbered 255,802 (250,827) of which 22,535 (23,225) were in-patients, and 233,267 (227,601) were out patients. Among in patients 1,668 (1,634) deaths occurred, giving a hospital death rate of 6.5 (6.5) per 1,000 patients. A further analysis of the data shows that there was an increase in the numbers of both European and African in patients treated at the three largest townships viz —

	Accra	Sekondi	Kumasi	Total
Europeans	289 (251)	225 (230)	164 (131)	661 (612)
Africans	3,035 (3,020)	1,326 (1,430)	2,463 (2,204)	6,876 (6,674)
Totals	3,334 (3,271)	1,554 (1,680)	2,629 (2,335)	7,537 (7,236)

At Kumasi Hospital there was a further drop in the number of out patient attendances 13,058 as against 13,645 in the previous year the probable causes contributing to this decline were commented upon in the preceding Report (see this *Bulletin* 1935 Supp p 17*) In-patients treated at Kumasi numbered 2,463 (2,204). There is a continuous demand for accommodation for indigent persons chiefly of French or Northern Territories origin, suffering from asthenia, malnutrition ulcers trypanosomiasis etc. existing accommodation is inadequate and a new ward is urgently needed. At Tamale in the Northern Territories 21,815 (21,520) patients were treated the work at this centre has increased rapidly during the past few years.

The Mission Hospitals continued to function actively throughout the year. At the Basel Mission Hospital at Agogo in Ashanti, 45 European and 395 African in patients and 3,572 out patients received treatment. Data relating to medical work undertaken by the Roman Catholic Mission are not given. Following the withdrawal of the Travelling Dispensaries in 1933 services were supplied by the fixed hospitals and dispensaries supplemented by the establishment of village dispensaries though the response from Chiefs with regard to the buildings for these dispensaries has been disappointing. Under the scheme four of the first batch of five students were successful at the examination held in 1934 and are now in charge of village stations it was expected that at least 15 would qualify during 1935 and that several additional village dispensaries would be established.

Malaria maintained its high position in the list of diseases accounting for roughly 10 per cent. of all cases treated. Total cases treated numbered 24,558 (25,584) distributed as to in-patients 1,545 (2,873) not 2,783 as stated in the last issue of the *Bulletin* and out-patients 23,013 (22,801). These figures include 22 (18) cases of blackwater fever. Among

In patients the type of infection was differentiated in 1,310 cases, and among out-patients in 11,770 cases with the following results, —
 in- and out-patient figures —

P. falciparum 12,272 (11,360) or 93.8 (91.7) per cent., *P. vivax* 62 (595) or 3.7 (4.9) per cent. and *P. malariae* 25 (44) or 0.2 (0.4) per cent. Splenic indices for 4,042 school children examined in four inspection centres were returned as follows: Accra 2,188 (1,588) index 22 (21) per cent., Cape Coast 323 (338) index 28 (29) per cent., Kumasi 1,415 (1,417) index 24 (24) per cent. and Takoradi 111 (112) index 17 (17) per cent. No age distribution is supplied for these data, though it is stated percentages declined with age. Total deaths ascribed to malaria during the year numbered 472 (485) representing 7.2 per cent. of deaths due to all causes. 49 of these deaths occurred in hospitals. Of *Lutzow fever* 24 (18) cases were recorded with 12 (8) deaths, hospital cases numbering 22 and deaths 8. Six (8) were Europeans with 3 (4) deaths; 4 (3) Syrian with 3 (1) deaths; 2 East Indians of whom 1 died and 1 (1) were Africans among whom 5 (3) deaths occurred. The various measures taken to control malaria remain as previously described (see this *Bulletin*, 1935 Supp. p. 18*)

Yellow Fever — Two fatal cases in Africans were reported, the only cases recorded during the year. This excellent record is the most remarkable in view of the number of cases reported from neighbouring territories and particularly from the French Ivory Coast. Since the immunization of *C. thalassius*, *Mesonoemias africana* and possibly *Eretmopodites chrysogaster* as potential carriers of the disease, the scope of mosquito prevention has had to be considerably extended. *Aedes aegypti* remains the chief vector hence the emphasis had to be domestic hygiene mosquito larvae—usually *Aedes*—were found in 9,930 cases following house inspections, an index of 0.5 (0.6). Anthroponotic work continued along the lines previously described (see this *Bulletin*, 1935 Supp. p. 19*) Numbers of European officials and private persons whilst on leave in England received protective inoculations with a comparatively low percentage of untoward reactions. It is hoped to make such immunization available locally in 1935. Vaccination cards supplied by Dr Findlay were issued to the Registrars of deaths at Accra, Cape Coast and Kumasi with a view to sections of five being obtained from cases in which death had occurred after a febrile attack of less than 10 days duration and had not been medically certified so instances of yellow fever have so far been disclosed by this method which, however, proved of great diagnostic value following its reproduction by members of the Rockefeller Foundation in South American countries.

In evigations were carried out with a view to the establishment of anti-samarai aerodromes two sites are available one at Accra and one at Tomele the latter of which is to be acquired by Government forthwith. As regards trypanosomiasis in addition to the summary previously supplied (see this *Bulletin*, 1935 Supp. pp. 194-200) the following facts are noted —

The report records 1,973 (1,179) cases with 112 (77) deaths. (In the Hospital Returns the figures read 1,883 and 114 respectively and on page 10 of the Report the numbers of registered deaths due to this cause are returned as 116.) The majority of the cases, 1,408 (81%) occurred

in the Northern Territories and in this area the figures from the treatment camp at Nakpanduri—the centre for investigating the incidence of the disease in the surrounding infected country—increased from 240 to 1 012. A small outbreak was reported towards the end of 1934 from the village of Kwale in the Lawa area where the forest for some miles round is thicker than usual. The whole available population of 126 was examined, and 59 cases or 47 per cent were found infected. An intensive tryparsamide and Bayer 205 treatment campaign began combined with the clearing of the bush over a large area of the fringing forest. A focus of infection at Kumasi from which station 202 (363) cases were reported, was the subject of investigation cases of the disease being reported among Europeans. (In the preceding year no European cases occurred in 1934 there were seven.) Extensive clearing was undertaken to control fly and met with some success.

The recommendations contained in last year's Report (see this *Bulletin* 1935 Supp. pp 20*-22*) were carried out as far as possible. It was further recommended that a political officer should be detached to work in co-operation with the Medical Department on special sleeping sickness duties connected with clearings which are being carried out on the aggressive and defensive lines recommended by Dr T. A. NASH Entomologist to the Tsetse Investigation of Northern Nigeria.

In his paper "On the bionomics and the Importance of *G. longipalpis* Wied. in the Gold Coast" (*Bull. Entom. Res.* 1934 Vol. 25 pp 309-335) Dr K. R. S. MORRIS speaks of the menace of this fly owing to deforestation and calls attention to the development of a secondary type of scrub very difficult to deal with but eminently suited to colonization by *G. longipalpis*. Dr Morris asserts that an improved system of native farming would not only ward off the danger from this most dangerous tsetse-fly but also would be the means of improving the food value of crops and thus assist in raising the general standard of health of the people.

Although plague invaded Dakar and other parts of the French Senegal there was fortunately no extension of the infection to the Gold Coast. As before, reliance was chiefly placed upon anti rat measures in the ports proofing of warehouses etc enforcement of building regulations to "build out" rats from dwellings efficient disposal of refuse protection of foodstuffs and destruction of rats by trapping and lithographic varnish. Over 100 000 rats were destroyed in ports and the more important centres. 2,040 rat carcasses were examined at the Accra Laboratory but none showed signs of *P. pestis* infection.

Enteric fever was responsible for 15 (14) deaths 12 (10) of these deaths occurred in hospitals, where 83 (129) cases were treated, 75 out of these being in patients. Dysentery cases treated in hospitals numbered 1 193 (1 433) comprising 316 (306) in patients and 877 (1 039) out patients 32 (38) hospital deaths were recorded. The nature of the infection was determined in 884 cases and of these 562 or 84.6 (79.5) were amoebic. Cholera does not exist in the Gold Coast no cases of cerebrospinal meningitis were reported during the year nor were any deaths recorded as being due to relapsing fever in spite of the influx of thousands of immigrant labourers from the French Territory of Hauts Volta.

The outbreak of Smallpox in the district of Togoland (see this *Bulletin* 1935 Supp. pp 18*-19*) was stamped out as a result of an

intensive vaccination campaign 333,099 (368,488) persons were vaccinated with lymph obtained from the Lister Institute.

Tuberculosis: caused the deaths of 695 (705) persons, and of these 642 were ascribed to the pulmonary form of the disease. In hospitals and dispensaries 1,273 (1,193) cases were treated, 1,074 (1,008) or 84.4 (84.3) per cent. being pulmonary cases. Hospital deaths numbered 206 (182) and included 182 (165) due to pulmonary tuberculosis. Pulmonary tuberculosis is therefore responsible for four-fifths of all forms of tuberculosis treatment in Government Institutions, and for one in every nine hospital deaths. For the Gold Coast as a whole, all forms of tuberculosis were responsible for 1 in every 9 and pulmonary tuberculosis 1 in every 14 registered deaths during the year under review. The problem is engaging the close attention of the authorities (see also this Bulletin 1935 Supp. p. 18*).

Over 25 per cent. of all cases treated at Government Hospitals, etc., were cases of yaws. These totalled 65,803 (60,384) cases. At Welfare centres the disease accounted for 13 per cent., at Kumasi 18 per cent. and at Tamale 27 per cent. of all cases seen. The leprosy clinics continued to function satisfactorily during the year (see also this Bulletin 1935 Supp. p. 18*) Hospital returns record 886 cases treated during the year and, in an Appendix presenting particulars of work done at the Ho Settlement it is noted that 411 (375) patients were treated.

Helmintiasis: — No fresh developments are recorded. A circular letter addressed to mining concerns advised the use of a 20 per cent. solution of salt and common rock-salt on the floors of and round latrines, and in latrine buckets as being lethal to hookworm larvae. As regards *draconthias* and *schistosomiasis* local authorities were advised to attempt the cultivation of *Balanites aegyptiaca* the seeds being lethal to the cyclops, cercariae and snail host (see also pp. 48* and 56* of the Supplement).

Venereal Diseases: — Total cases treated at the Venereal Disease Clinic at the Gold Coast Hospital numbered 2,218 (1,977) new cases numbering 1,303 (1,034).

Scientific: — The routine examination of material at the Accra Laboratory received from various hospitals and institutions in the Colony included blood specimens for parasites 5,453 (5,364) feces 4,149 (4,193) urine 2,058 (2,166) Wassermann tests 3,252 (3,261) and water samples 275 (251).

The figures contained in the Report of the Chemical Laboratory show a striking similarity in practically every detail to those appearing in the last Report. A total of 1,768 (1,726) samples was dealt with, of which 1,172 (1,089) were samples received from the Customs Department.

Financial: — Total expenditure on Medical, Health and Research Services amounted to £282,253 (£278,124) or 12.1 (12.1) per cent. of the total expenditure of the Colony. Expenditure figures are exclusive of the cost of buildings (hospitals, dispensaries, etc.) and other public health works, such as water supplies, town improvements, etc.

SIERRA LEONE (1934)

The Colony and Protectorate of Sierra Leone has an area of nearly 28 000 sq miles a little less than that of Scotland. The sea coast is 210 miles long and extends from Kragba on the border of French Guinea to the Mano River on the border of the Republic of Liberia.

Vital Statistics—There are four systems of registration in force varying in the extent of their compulsion and designed to cover the different conditions existing in the Colony and in the Protectorate. Registration is compulsory in the Colony, in the Protectorate it is (a) compulsory in respect of non-natives (b) it may be made compulsory in a chiefdom in respect of all natives on request of the Paramount Chief to Government and (c) any native may make a registrable declaration i.e. *Permissive Registration*. The assembled and published data may be considered approximately accurate only in the case of Freetown for the remainder of the Colony rigid control is not at present obtainable. In the Protectorate registration is only beginning and in 1934 only 0·4 per 1 000 of the population was covered.

The distribution of recorded facts between the Colony, Freetown and the Protectorate was as follows —

Area	Population	Births	Birth Rate	Deaths	Death Rate	Infant Deaths	I.M.R.
The Colony	100 587 (99 239)	2,273 (2,326)	22·5 (23·4)	2 334 (2,205)	23·7 (22·2)	530 (540)	233 (232)
Freetown	59 523 (58 175)	1 339 (1,378)	22·4 (23·6)	1 361 (1 229)	22·8 (21·1)	312 (317)	233 (230)
The Protectorate	1 672,058 (approx.)	333	—	320	—	43	—

It will be observed that so far as the Protectorate is concerned the numbers of registered births and deaths are so small that rates cannot usefully be calculated.

Of other elements of the community the following facts are recorded.

European officials—Resident officials numbered 208 (218) with an average number resident of 144 (155). 9 (7) were invalidated but no (1) deaths were recorded. *European non-officials* numbered 442 (400) the average number resident being 306 (285). There were no (3) deaths but 13 (7) were invalidated.

African officials—The total number resident was 930 (960) with an average number resident of 920 (950). Seven (4) deaths occurred, and 7 (10) officials were invalidated during the year 2 on grounds of *amnesia*.

African Troops—Average strength 383 (374) number on sick list 484 (403) and 1 (2) death during the year.

African Police—Total strength 285 (285) number on sick list 202 (313) and 2 (0) deaths during the year.

Maternity and Child Welfare—Good progress in this field of work is reported. Admission to the Maternity Ward of the Connaught Hospital numbered 501 (382). 331 (281) women gave birth in the ward in 313 (281) cases, the pregnancy was single, and there were 18 (0) twin labours. Total admissions include 18 women who gave birth before admission, and 152 ante-natal cases. There were 12 (2) maternal

deaths, though 9 of these patients were in a condition unfavourable to their recovery before admission.

The removal of the Ante-Natal Clinic and Infant Welfare Centre to more convenient premises where infant ante-natal and post-natal work have been centralized, has had the effect of increasing attendances by about 50 per cent. At the Ante-Natal Clinic 622 (587) new cases were registered and a total of 4,684 (4,248) attendances recorded. The Post-Natal Clinic continued to function successfully 233 (1*1) new cases and 592 (237) attendances being recorded during the year.

Infant welfare work has continued to be carried on along the lines previously described (see this *Bulletin* 1935 Supp. p. 24). Health visitors attended 709 (748) newly born babies and paid 5,008 (4,839) visits. Children under three years of age brought to the Clinic numbered 737 (764) and of these 37 (80) were under one week old, 133 (155) under one month and 317 (317) from one to three months old. The falling off in the numbers under one week old is attributed to the efforts of health visitors who have advised mothers not to leave their houses with their children so early in the puerperium.

School Hygiene—The sanitary condition of many of the Schools is unsatisfactory, and likely to remain so until money is available for necessary improvements. From time to time as his other duties permit the Medical Officer of Health examines school children, but, under existing conditions, the numbers so examined form but a very small proportion of the children attending Freetown Schools. No details of the results of these examinations are given. The principles of health and sanitation form part of the curriculum of the various schools.

Public Health Sanitation etc—The general health throughout the Colony and the Protectorate was satisfactory the increased number of cases treated being regarded as evidence of increased desire on the part of the people to receive hospital treatment. The usual anti-mosquito and anti-malaria measures were carried out to the limits of financial allocations the present staff of inspectors could be increased with advantage and more intensive training of young inspectors is desirable. Sewage and refuse disposal systems function as previously described (see this *Bulletin* 1935 Supp. p. 25*). The use of badly-constructed pit latrines in the Protectorate gives rise to the fly nuisance. During the year an experiment was made with an old ship's plate in which squatting holes had been cut the pit proved a success and it is hoped to extend the system.

Drainage and other sanitary improvements were carried out in Freetown and in certain areas in the Protectorate. During the year a commencement was made on the drainage of the swamp which encircles the town of Bo in the hope that this would greatly reduce the incidence of mosquitoes and malaria in that important centre. The question of water-supply shortage in Freetown during the dry season was considered a proposal to develop further sources of supply in the Orogua River Basin was postponed until the financial situation improves. In the Protectorate most supplies are derived from rivers, streams etc. The Paramount Chief at Fura with praiseworthy effort walled in with cement a spring source of supply while in some centres small pipe-borne supplies serve the European Resident hospitals, etc. where these exist. One of these supplies can be considered safe potable waters, as they are untreated.

As regards labour conditions while agriculture remains the main occupation of the people, there has been a considerable extension of mining activities in the Protectorate and this development though welcome from the financial aspect has led to the establishment of insanitary conditions in various places. The passing of the Labour Code in Nov. 1934 provides the Medical Department with more extensive powers which will be applied to ensure the welfare of workers is adequately protected. Sanitary inspections in the southern and northern areas were carried out, and, in addition the Chief Sanitary Superintendent proceeded to Yengema, the headquarters of the Sierra Leone Selection Trust Diamond Company, to clean up and replan the native village which had expanded from a village of a few hundred people to a town of over 3,000 inhabitants.

A scheme of central control by a body of officers representatives of the departments principally concerned in the matter of housing and town planning is at present under consideration. In the Protectorate all building operations in Health Areas are controlled by the Medical Officers whose approval of design and general lay-out is necessary before any building may be erected.

Port Health Work — The Port was not in quarantine during the year for though yellow fever was notified from nearly all West African Colonies and French Senegal was infected with plague the strict precautions exercised were successful in preventing the entry of these diseases. Freetown is the main Port at which Kroo-boys^a are taken on to work ships down the Coast, and on completion of their contract are disembarked again when the ships call on their homeward run. 734 (648) ships entered the Port and 31,301 Kroo-boys were medically examined (see this *Bulletin* 1935 Supp. p. 25*).

Hospitals Dispensaries Clinical etc — There has been no change in the numbers of hospitals maintained and Mission hospitals subsidized by Government (see this *Bulletin* 1935 Supp. p. 26*). A decrease in the number of in-patients treated in the Protectorate a considerable increase in the numbers of those treated in the Colony and a marked increase in subsequent attendances for hospital treatment are noted. The relevant figures were —

Area	In-patients		Out-patients		Hospital Deaths	
	Europ- ean	African	Europ- ean	African	Europ- ean	African
Colony Protectorate	103 (114) 0 (9)	3,500 (2,964) 1,676 (2,176)	350 (313) 115 (95)	45,436 (38,524) 47,418 (53,445)	0 (3) 0 (1)	256 (212) 78 (88)
Total	—	103 (123) 5,178 (5,140)	465 (408)	53,834 (51,969)	0 (4)	334 (298)

Subsequent attendances totalled 339,485 (254,796). The increase in the numbers of recorded deaths is attributed to stricter control of registration.

There was a marked increase in the numbers of cases treated at the Connaught Hospital. In-patients (exclusive of maternity cases see above) numbered 2,464 (2,268) out-patients new cases 17,155 (17,313) subsequent attendances 103,511 (50,147). Re-organization and the

deaths, though 9 of these patients were in a condition unfavourable to their recovery before admission.

The removal of the Ante-Natal Clinic and Infant Welfare Centre to more convenient premises where infant ante-natal and post natal work have been centralized has had the effect of increasing attendance by about 50 per cent. At the Ante-Natal Clinic 822 (567) new cases were registered and a total of 4,684 (4,248) attendances recorded. The Post Natal Clinic continued to function successfully 233 (121) new cases and 592 (287) attendances being recorded during the year.

Infant welfare work has continued to be carried on along the lines previously described (see this *Bulletin* 1935 Supp. p. 24^a). Health visitors attended 709 (748) newly-born babies and paid 5,006 (4,858) visits. Children under three years of age brought to the Clinic numbered 737 (784) and of these 37 (60) were under one week old, 133 (165) under one month and 317 (317) from one to three months old. The falling off in the numbers under one week old is attributed to the efforts of health visitors who have advised mothers not to leave their homes with their children so early in the puerperium.

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Total	103 (123)	5,178 (5,140)	463 (408)	95,854 (91,988)	0 (4)	334 (296)

Subsequent attendances totalled 339,485 (254,786). The increase in the numbers of recorded deaths is attributed to stricter control of registration.

There was a marked increase in the numbers of cases treated at the Connaught Hospital. In patients (exclusive of maternity cases see above) numbered 2,464 (2,268) out patients, new cases 17,155 (17,318) subsequent attendances 105,511 (50,147). Re-organization and the

placing of favourable contracts had the effect of reducing the cost of maintenance per diem per patient from £2. 1d. in 1933 to 8d. in 1934. At the European Hospital Nursing Home, 99 (112) cases were admitted. At Makendi Hospital in the Northern Province there were 204 (318) in-patients and 1,919 (1,429) new out patient cases, and at Bo in the Southern Province, 410 (278) and 2,379 (2,473) respectively.

The eighteen Government Dispensaries continued to function as previously described (see this Bulletin 1933 Supp. p. 28*).

The principal diseases and numbers of cases treated at the various Hospitals and Dispensaries were: Acute and chronic rheumatism 7,563 (5,777), burns 7,382 (7,655), acute and chronic bronchitis 10,108 (9,090), malaria 6,197 (6,548), external injuries 4,887 (4,413). The increase in the number of cases of chronic rheumatism 7,559 (5,157) is attributed to more careful diagnosis of the condition. There was also an increase in *entomiasis*, 455 (327) largely due to the fact that more people sought relief from their ailments.

Malaria.—Fewer cases of malaria were reported, 6,197 as compared with 6,548 in 1933. There were 102 (96) European cases with no deaths distributed as to 60 subtertian, 11 quartan and 3 benign infections of the remainder 27 were unclassified, and one was a case of blackwater fever. African cases numbered 8,065 (8,482) of which 6,138 (4,321) were unclassified as to type of infection, 13 (37) were cachetic, and there was one (8) case of blackwater fever. Among the remaining 923 (2,182) cases, 781 (1,583) or 85.8 (71.6) per cent. were subtertian, 108 (106) or 11.5 (4.8) per cent. were quartan and 23 (51.5) or 2.5 (2) per cent. benign tertian. At the Connaught Hospital Laboratory 3,329 (3,018) blood smears from Africans and 217 (380) from Europeans were examined. 933 (758) of the former and 78 (94) of the latter being found to contain malaria parasites. Comparison of the percentage proportion of typed infections as given in the body of the Report and as the result of laboratory examination is not without interest, viz. —

Infection	Europeans				Africans			
	1933		1934		1933		1934	
	Report	Lab.	Report	Lab.	Report	Lab.	Report	Lab.
Benign tertian	33.4	1.1	4.1	0.0	5.5	0.0	2.5	0.0
Quartan	16.4	22.3	14.9	19.2	4.8	36.5	11.5	31.2
Subtertian	45.2	76.6	81.1	80.8	71.6	63.4	83.4	77.1

The daily and systematic inspection of compounds was continued, and during the year 130,182 (108,638) visits for this purpose were made. Mosquito larvae were found in 498 (271) cases, and identified as to Aedes 438 (236), Culex 58 (26), Anopheles nil (7) while of 190 (204) samples found in pools and gutters, etc. 80 (125) were Aedes, 38 (40) Culex and 72 (39) Anopheles. In addition to these and other routine anti-mosquito measures, a considerable amount of tree-felling, tree-chipping and cementing, bushing and weeding was carried out in Freetown and in several Protectorate Stations with beneficial results. It is of interest to note that 749 samples out of a total of 1,239 samples of Aedes found in Freetown were discovered breeding in trees.

Smallpox continued (see this *Bulletin* 1933 Supp. p 27*) mostly in the Southern Province though minor foci of infection were reported from various districts in the North the persistence of the disease was attributed to increased opportunities for spread of the infection by public transport services coupled with the aversion of the people to vaccination. 2,333 (2,378) cases were discovered and 313 (280) deaths occurred the distribution of cases and deaths was—Colony Districts 220 (32) cases and 37 (2) deaths Protectorate Districts Northern Province 379 (473) cases 22 (8) deaths Protectorate Districts Southern Province 1,734 (1,873) cases and 204 (277) deaths The activities of the Health Department were concentrated upon centres of infection lying along main traffic routes. All deck passengers and Kroo-boys embarking or returning to Freetown were medically examined and, if necessary vaccinated. A total of 53,827 (57,141) vaccinations was carried out during the year.

Of *extreme fever* 6 (3) sporadic and independent cases with 1 (3) death were recorded the source of infection could not be discovered. Two (0) were cases of typhoid among Europeans the remaining 4 (3) including the fatal case were in Africans 2 were not defined, one typhoid and one paratyphoid B. There were 423 (203) cases of *syphilis* reported with 49 (81) deaths cases were classified as to 226 (304) amoebic 196 undefined and only 1 (12) bacillary. The figures are regarded as an untrustworthy index of the incidence of the disease especially in many Protectorate villages where the standard of even elementary sanitary principles is low European cases numbered 5 and Africans 418.

Although *yellow fever* was widespread in West Africa during the year and French Senegal infected with plague no case of either of these diseases was reported in Sierra Leone (see also under *Port Health* above). Systematic rat catching was carried on 5,783 (4,900) rats being caught and 439 (156) smears examined, but no evidence of plague infection was detected.

Tuberculosis is said to be fairly evenly spread over the whole territory but lack of diagnostic facilities in the Protectorate has the effect of making the number of cases reported from that area appear smaller than those recorded in the Colony 257 (258) African cases were reported with 26 (29) hospital deaths and 1 non-fatal European case 236 (243) of the African cases with 22 (26) deaths and the single European case were of the pulmonary type of the disease which was responsible for a total of 49 deaths in the territory during the year.

There was a slight increase in the number of *leprosy* cases reported, 212 compared with 206 in 1933. A leprosy survey has been commenced and data should be available during the early part of 1935. Until the results of the survey are known comment is restricted to observing that the disease is known to be spreading in the Protectorate and in the Colony.

Enteric Diseases show a slight but welcome decrease with 2,710 (2,802) cases of which 2,234 (2,236) were gonorrhoea, and 476 (616) syphilis. There were also fewer cases of yaws 7,382 as against 7,635 in the previous year but the number of patients who presented themselves for further treatment showed a considerable increase.

Helminths—The number of cases treated at various Government institutions is said to be 6,106 (4,825) but this figure omits inclusion of

333 cases of *filariasis* treated during the year and which appear in the Hospital Returns under the title *tropical elephantiasis*. Would it not be advisable to use these terms with greater precision? In the 1933 Report 282 cases of elephantiasis are recorded in the group defined as

Diseases of the Skin and Cellular Tissues," and that these are regarded as comparable with the filariasis cases of 1934 is clear from the reference there were 333 cases (of filariasis) compared with 282 cases in 1933. *Tropical elephantiasis* is regarded as a filarial disease, but the title unqualified, in modern medical nomenclature is classed under Diseases of the Skin and Cellular Tissue. On the other hand, *filarial elephantiasis* and *filariasis* are deemed to signify conditions which, being due to the same ascertainable exciting cause, should appear under *Helminthiasis* or *Diseases due to Helminths*."

The distribution of the 6,106 cases mentioned above indicated the various forms of infestation as being Ascaris 5,548 (4,506); Taenia 262 (314); Ankylostoma 209 (131) and Schistosoma 89 (74). Ascariasis is said to be common everywhere but ankylostomiasis and schistosomiasis more prevalent in the Protectorate where methods of night soil disposal are more primitive and water supplies more liable to faecal contamination than in the Colony. The increase in the number of cases of filariasis is attributed to increased willingness on the part of sufferers to seek treatment, but even so the numbers treated represent but a small proportion of the actual number of infections which mainly occur in the Protectorate. No case of *dracunculus* was reported, and it is believed the disease is non-existent in Sierra Leone.

At the Connaught Hospital Laboratory 2,194 (2,267) faecal specimens from the stools of Africans were examined. Ankylostome ova were found in 467 (465); Ascaris in 328 (461); Trichuris in 188 (150); Strongylodes in 170 (137) and Taenia in 10 (25).

At the Ophthalmic Clinic which was opened in March 1934 much useful work has already been accomplished, new cases numbering 350, and subsequent attendances 916. Analysis of cases treated shows that the majority of patients attended for affections of the conjunctiva, errors of refraction and amblyopia. Not the least interesting result of the work of the Eye Clinic is the fact that many cases of *avitaminosis* have been brought to light. Twelve of the 23 cases of amblyopia, 9 of the conjunctivitis and 2 cases of optic atrophy were associated with definite signs of avitaminosis, and others were probably due to the same cause.

There were two outbreaks of rabies during the year and on the occurrence of the second outbreak the Muzzling Order was introduced and strictly enforced. 690 dogs at large, unimmunized, being seized and destroyed. 84 persons who had been bitten by dogs received anti-rabic treatment and one case of human rabies in a young African girl terminated fatally.

Of other diseases it remains to say that *respiratory diseases* (excluding tuberculous) and *diseases of the digestive system* are important causes of ill health. Upwards of 26,000 cases of the latter and over 12,000 cases of the former were treated at Government Institutes during the year. Special measures are being taken to ascertain the various types of malnutrition disease appears to be increasing during the year 41 cases with

3 deaths were recorded as compared with 22 cases and one death in 1933. Four (0) cases of *trypanosomiasis* were reported with one (0) death from various parts of the Protectorate.

Reports—Routine work carried out at the Connaught Hospital laboratory in connexion with the examination of blood films faecal specimens and rat smears has already been referred to above. According to the laboratory report the total of 10 114 (10 732) specimens dealt with during the year included, in addition to those already mentioned, 488 (812) V.D. smears 247 (276) sera for Kahn tests 2,357 (2,723) urines etc. *The Report of the Surgical Specialist* records a larger number of cases dealt with at the Surgical Clinic than in any previous year. The year was remarkable for the number of operations for acute appendicitis among Europeans 252 (191) operations for hernia on Africans with 4 (3) deaths while 42 patients were relieved of elephantoid scrotum without any mortality. Operations during 1934 totalled 2,281 as against 1,877 in 1933.

Financial—Departmental expenditure totalled £65 742 (£67,246) made up as to £48,257 (£49 165) for Medical, and £17 485 (£18 081) for Sanitary Expenditures respectively.

COLONY OF THE GAMBIA (1934)

The Colony of the Gambia was created in 1843 previously from 1807 having been under the Government of Sierra Leone and was constituted a separate government 45 years later in 1882. It now consists of the Island of St. Mary (on which is Bathurst the seat of Government) British Komo Alreda, the Ceded Mile the territories of Brefet and Bajana and MacCarthy Island. This last forms the line of demarcation between the Upper and Lower portions of the Gambia River. The total area of the Colony and Protectorate is 4 132 sq. miles.

Vital Statistics—The data relating to various elements comprising the population of Bathurst may more conveniently be presented as follows —

Item	Africans	Europeans and Whites
Estimated population	14 045 (14 132)	200 (195)
Total births	351 (331)	Nil
Birth rate	25.0 (23.4)	Nil
Total deaths	438 (368)	4 (all Yellow Fever deaths)
Death rate	31.2 (30.0)	20.0
Infant deaths	—	—
Infant mortality rate	276 (290)	—

The group "Europeans and Whites" includes 65 (63) resident European officials (average number resident 50 (51). One (3) was invalidated and 2 deaths due to Yellow Fever were recorded. African officials numbered 281 (278) the average number resident being 273 (202) 3 (5) were invalidated and one (1) death was recorded.

Maternity and Child Welfare—Clinic attendances during the year were as follows: General Clinic 3,003 (2,999); Weighing Clinic 2,828 (2,257); Ante-natal Clinic 546 (564). In the wards of the Clinics, attendances of ante-natal patients numbered 45 (38) and 81 live births and 12 stillbirths and miscarriages were recorded. This section of the Report erroneously observes that the infant mortality rate of the Clinics was 129 per mille. This figure has been obtained by relating the 12 stillbirths and miscarriages to the 93 total births, stillbirths and miscarriages recorded. In the calculation of an infant mortality rate the numbers of children born alive but dying during the first year of life only must be related to *live births only*. Stillbirths and miscarriages must be excluded from numerator and denominator of the calculation, and not included in both as has been done in this case.

School Hygiene—Medical inspections of school children are carried out by Government Medical Officers, while elementary hygiene and sanitation are taught to the children as part of the school curriculum.

Public Health Sanitation, etc.—There was an unfortunate reappearance of yellow fever during the last month of the year six cases were reported and five of these proved fatal, four being Europeans and one African. Bathurst was declared "an infected place" on November 12th and following the notification of a fourth case, outside help was sought. Dr J. A. A. Duxax Assistant Director of Health Services, Sierra Leone arrived, took over control and inaugurated an intensive sanitary campaign. A special Appendix to the Report describes in detail the measures taken to deal with the outbreak.

As regards general hygiene and sanitation, routine services continued to be carried out as previously described (see this Bulletin, 1933, Supp. p. 23*; 1934 Supp. p. 23* and 1935 Supp., p. 29*) while the following improvements were effected during the year. The dumping ground for household and other refuse was removed to the Lasso Wharf end of the Lasso Wharf tidal basin and approximately 2,000 tons of refuse used in the reclamation work. Four field incinerators were erected and gave satisfactory service. Chlorination of the pipe town water-supply at source was introduced, and eight new standpipes were erected at different points in the town of Bathurst.

Hospitals Dispensaries Clinical Returns, etc.—In-patients treated at the Victoria Hospital, Bathurst numbered 1,129 (1,027) and of these 1,092 represented new admissions during the year 139 (112) hospital deaths were recorded. Out-patients numbered 16,420 (12,748). At the Georgetown Hospital 253 (249) in-patients received treatment, 235 were new admissions during 1934 there were 33 hospital deaths, and 3,273 (3,482) persons received out patient treatment.

The numbers of new cases treated at the various dispensaries were as follows: Basse, 933 (1,212); Kanu or 729 (872); Bush, 57 (57) and at the Voluntary Dispensary Kertwan, 2,049. No details are supplied of principal causes of sickness treated at these dispensary centres.

As regards in-patients and out-patients at the two hospitals, it is noted that Diseases of the Digestive and Respiratory Systems (including tuberculous) remain the most prevalent. At the Bathurst Hospital 3,925 cases of the former were treated, 181 being in-patients among whom 15 deaths occurred there were 3,425 cases of Respiratory

diseases 127 of these being in patients with 31 deaths. At the Victoria Hospital, Georgetown 38 in patients with 2 deaths and 636 out patients received treatment for various digestive ailments and 36 in patients with 8 deaths and 266 out patients were treated for respiratory affections.

No case of *smallpox* or *plague* was reported during the year the outbreak of *yellow fever* is referred to under Public Health above.

Of *malaria* 934 (811) cases were recorded at the Bathurst Hospital 117 (56) being in patients with 3 deaths. All in-patient cases were returned as subtertian infections and among the 817 out-patients 139 were diagnosed as subtertian and 678 unclassified. 215 malaria patients received treatment at the Georgetown Hospital, 6 were in patients and there were no deaths. All the 215 cases were returned as subtertian infections. One non fatal case of *blackwater fever* was recorded at the Bathurst Hospital.

597 (377) cases of *trypanosomiasis* were treated at Bathurst and 303 (233) at Georgetown of the former 36 were in-patients with 9 deaths and of the latter 80 were in patients and 12 deaths were recorded. Arrangements have been made for a survey of the whole Protectorate during 1935.

It would be of interest to know why the title *trypanosomiasis* appears twice in the Return of Diseases and Deaths the first time as Title No 25 (b) and again as Title 42.

Amoebic dysentery was responsible for 15 in-patients and 36 out patients and bacillary dysentery for 9 cases among in patients and 17 among out patients at Bathurst. 5 deaths were ascribed to the amoebic and 2 to the bacillary type of the disease. The 8 cases recorded at Georgetown were unclassified.

From Bathurst 29 cases of *leprosy* were returned as compared with 30 in 1933 while 86 out patient cases were recorded at Georgetown. So far as Bathurst returns are concerned it is believed that the absence of spectacular results following treatment has affected the attendance of many sufferers from the disease.

General Diseases—15 cases of *syphilis* comprising 7 in-patients and 8 out patients and 196 (123) cases of *gonorrhoea* 17 being treated as in-patients were reported from Bathurst. At Georgetown the 26 cases of *syphilis* included 3 in-patients while 78 of the 80 cases of *gonorrhoea* were out-patients.

Of diseases due to *helminthic infections* 420 cases of which 388 were cases of *ascariasis* and 459 which included 413 *ascaris* cases were treated at Bathurst and Georgetown respectively there were also 31 cases of *filarial elephantiasis* and 25 at Georgetown. In connexion with these (and other) titles appearing in the Hospital Returns it is a little unfortunate that a more recent classification has not been adopted. The 1929 revision of the International List provides for all helminthic infections under Titles Nos. 40-42 in the group Epidemic Endemic and Infectious Diseases. In the Annual Report under review some of these appear under Title 116 in the group Diseases of the Digestive System while filarial elephantiasis myiasis etc. appear under Title 155 among Affections of the Skin and Cellular Tissue.

There were no admissions to the Infectious Diseases Hospital. The Prison Hospital, Bathurst treated 34 in patients and 163 out-patients during the year 4 deaths were recorded, 3 being ascribed to dysentery.

Laboratory Report—At the Victoria Hospital Laboratory a total of 995 (788) specimens were examined. Faecal specimens numbered 261 (207) 30 contained ankylostoma 30 E. histolytica, and 15 ascari. Blood films totalled 81 (112) and of these 12 contained subtropical parasites and 2 trypanosomes. Of 55 specimens of blood obtained by gland punctures 24 were positive for trypanosomes.

Financial—Expenditure on the Medical and Health Services amounted to £22,217 (\$22,034) or 12.7 per cent of the total expenditure of the Colony

EAST AFRICA

KENYA COLONY AND PROTECTORATE (1934)

Kenya Colony and Protectorate is in Eastern Equatorial Africa. It is bounded on the north by Abyssinia and the Sudan, on the west by Uganda on the South by Tanganyika Territory and on the east by the Indian Ocean and Italian Somaliland. The total area is 224 960 sq miles and is divided into nine provinces Nyanza Nairobi Turkana Rift Valley Masai Kikuyu Ukaraba the Coast, and the Northern Frontier Provinces. Its capital is Nairobi and Mombasa the principal port.

No changes were made in the system of public health administration of the Colony the problems of Departmental Administration were rendered unusually difficult as a result of financial restrictions involving depletion of staff etc. These matters are briefly referred to under Public Health hereafter.

Vital Statistics—The only non-native population figures supplied are those resulting from the 1931 census viz. Europeans 16 812 Indians 39 644 Arabs 12,166 Genoese 3,979 and Others 1 346. The African population was estimated at 3 024 975 (3 017 117). As regards Officials the following facts are provided—

European Officials resident 1,846 (1 756) average number resident 1,380 (1,340) number invalided 9 (5) total deaths 4 (3) Non-European Officials number resident 2 448 (2,457) average number resident 2,068 (2 103) number invalided 8 (7) total deaths 9 (4).

The position in respect to the registration of births and deaths remains unsatisfactory except in the Nairobi Municipal Area and in one Native Reserve where an elementary system is operated by the Government Medical Officer. The Principal Registrar of Births and Deaths observes that any attempt to calculate crude birth and death rates on the bases of available data would prove entirely misleading if not actually dangerous.

During the course of specific investigations certain vital facts were recorded these will be commented upon in the course of the summary notes which follow.

Maternity and Child Welfare—The Government Medical Department the Missionary Societies and the Lady Grigg Welfare League are the main agencies carrying out this work in Kenya Colony five Missionary Societies and three branches of the Lady Grigg Welfare League receive Government grants-in aid.

At the three centres in Nairobi 46,929 (35,325) attendances were recorded and 7 738 (4,373) house visits made during the year at five (3) Mombasa centres the numbers were 33,827 (23,163) and 15,206 (17,989) and at the two centres in Eldoret 13,998 (9,278) and 4 704 (6,001) respectively. At all these urban centres work has been progressive but the very popularity of the centres militates against increased house visiting the basis of all child welfare work whether in Africa or elsewhere. Without increased staff this side of the work cannot be expected to progress.

As regards the work in rural areas it is of importance to note that whereas a few years ago maternity cases were rarely brought to hospital and the few that were comprised the hopeless cases nowadays the num-

Laboratory Report—At the Victoria Hospital Laboratory a total of 995 (788) specimens were examined. Faecal specimens numbered 281 (207). 30 contained ankylostoma, 30 *E. histolytica* and 15 ascaria. Blood films totalled 81 (112) and of these 12 contained subtropical parasites, and 2 trypanosomes. Of 53 specimens of fluid obtained by gland punctures 24 were positive for trypanosomes.

Financial—Expenditure on the Medical and Health Services amounted to £22,217 (£22 034) or 12.7 per cent of the total expenditure of the Colony.

EAST AFRICA.

KENYA COLONY AND PROTECTORATE (1934)

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women attend voluntarily before labour has commenced. The problem is no longer a psychological one, but economic—only a lack of beds stands in the way of the establishment of a very extensive indoor maternity service and the lack of sufficient and suitable women to be trained, and lack of training facilities the obstacles to the establishment of adequate home midwifery services.

The maternity and child welfare services carried out by the Native Missions throughout the Colony are of the greatest value. The three branches of the Lady Grigg Welfare League are doing exceedingly good work at the African centre in Nairobi 303 (304) labour cases were taken while of the 13 (12) African midwives in training three qualified during the year at the Indian Maternity Centre, Nairobi, 184 (173) labour cases were taken 4 (7) midwives were under training and one (2) qualified. At the African Maternity Centre, Mombasa, 181 (88) labour cases were admitted.

School Hygiene—There is still no School Medical Service. In the Reserves Medical Officers have carried out, when possible, a certain amount of school medical inspection, but having regard to pressure of other duties and responsibilities they are unable to devote as much time as formerly to this class of work.

Public Health Sanitation etc—While demands for indoor or outdoor medical relief continued to increase financial restrictions forced further reductions in personnel. During the course of five years the Medical Staff has been reduced from 72 to 52, while during low years the total number of patients treated has risen from 827,123 to 1,229,822. These conditions have imposed unusually heavy demands upon medical and nursing staffs, and in some cases it was impossible to maintain full sanctioned staffs in all posts throughout the year. Dr PATERSON pays a graceful and generous tribute to the work of the European Nursing Sisters who in the overcrowded and often inconvenient Native Hospitals, have known but few hours when they were not on duty.

The Report for 1933 contained information relating to the health of two important tribes in Kenya, the Coastal Digo and the Highland Masai, and certain conclusions based upon the data were expressed. During 1934 data relating to an important tribe, the Emba, inhabiting the high and fertile country in the neighbourhood of Mount Kenya, were collected, and give additional support to the view that the state of the public health of the native inhabitants is far from satisfactory. The information was assembled by the Medical Officer of the District in an area which had been "sanitised" by the occupants, by digging latrines, etc., and who were anxious to receive treatment for intestinal worms. Altogether 3,750 persons, approximately 80 per cent. of the total population in the area attended for treatment. Of a random sample of 53 stools microscopically examined, 51 or 96 per cent. were infected of 128 random blood specimens, 15·6 per cent. were positive for malaria parasites. Among 658 children aged 0-15 years, the nutritional condition was defined as good in 15·2 per cent., fair in 64·9 per cent., poor in 13·5 per cent. of total cases. The reporting officer concludes that "wrong methods of feeding result in 90 per cent. of the surviving children of 10 years and under being malnourished."

The data relating to the Asian population are either too small or too unreliable to justify detailed analysis but the general impression is that the average standard of health is poor.

As regards the general standard of European health in Kenya in the absence of complete and reliable data all that can be said is that though it still leaves room for improvement the standard of health is good.

A large amount of anti-malarial work based on previous mosquito surveys directed by the Medical Entomologist was carried out during the year.

There is nothing new to record in regard to general measures of sanitation. Routine work was carried out as usual by local authorities though the amount and quality of work suffered by lack of funds and much very essential work remains to be undertaken. With regard to labour conditions the only notable development took place on the gold fields, where a number of compounds all of a temporary nature were established and were well managed. No major housing or town planning schemes were adopted in urban areas in the Native Reserves work proceeded steadily if slowly. Routine inspection of food markets, drains etc was carried out as usual.

Efforts were continued as heretofore to spread the knowledge of hygiene and sanitation, especially in the Native Reserves. Work of this kind is a routine responsibility of almost every Officer of the Department. As usual large numbers of pamphlets on various subjects were widely distributed.

The training of Africans to be dispensary health workers was continued at the Jeanes School.

In concluding this section of his Report Dr PATERSON comments upon the steadily increasing demands made by the African population for medical relief and observes it is doubtful whether it will even be possible to maintain all existing institutions on the present financial provision. No useful purpose would be served by making recommendations with regard to new schemes of work which must of necessity involve large additional expenditure. On the other hand, he emphasizes the importance of utilizing this period of financial restriction for purposes of acquiring fresh knowledge to be applied when new work again becomes possible and to this end suggests lines of research and investigation designed to render great services not only to the development of the peoples and industry of Kenya but to the development of medicine as a whole.

Port Health Administration—During the year 584 (599) steamships and 1,633 (1,385) dhows entered Kilindini or Mombasa Harbours. In spite of the existence of a serious epidemic of smallpox in the districts surrounding Mombasa throughout most of the year the town and port remained free from this and other major infectious diseases. Regulations relating to the examination of ships on arrival against the introduction of infectious diseases etc. remained unchanged. Rats were trapped as usual and examined for plague but none was found infected.

Hospitals Dispensaries etc—Reference has already been made (see under Public Health above) to the large increase in the numbers of patients treated during the past four years. Though the bulk of this increase has taken place in out-dispensary patients there has also been an increase of hospital in-patients and out patients the figures for the

year under review being as follows. In-patients—European 2,271 (2,182) Asiatic and African 42,938 (38,443). Out-patients—European 1,264 (1,327) Asiatic and African 331,979 (300,277). Out Dispensary patients—851,370 (774,302). A feature of the year was the general improvement of the standard of medical and surgical work and of the nursing. Over five thousand operations were carried out at native Hospitals and nearly four hundred at European Hospitals, under general anaesthesia and many hundreds under various forms of local anaesthesia. In this connection the Surgical Specialist observes the type of disease for which surgical treatment is sought is definitely altering and nowadays a very much larger number of major operations is being performed. Cases of surgical tuberculosis and malignant disease are increasing.

In addition to Government Hospitals and Institutions, valuable medical work is carried on at the hospitals of various Missionary Societies receiving financial aid from Government. Three Church of Scotland Mission Hospitals having a total of 243 beds, treated 3,24 in-patients 48,129 out-patients 37,470 cases at their dispensaries, and conducted 445 confinements. The two Church Missionary Society Hospitals have 165 beds and at these institutions 2,310 in-patients, 27,582 out-patients, 23,320 out-dispensary patients and 136 confinement cases received treatment. At the Seventh Day Adventist Hospital of 60 beds in-patients numbered 519 out-patients 23,635 out-dispensary patients approximately 2,600 and confinements 60. At the Methodist Missionary Society Hospital with 20 beds, there were 77 in-patients, 21,869 out-patients 23,047 out-dispensary patients, and 11 confinements treated, and at the Neukirchen Mission Society Hospital with 25 beds, in-patients numbered 1170 and confinements 20. At all these Mission Hospitals a qualified medical practitioner and one or more European Sisters are employed.

Malaria.—During the year under review 35,215 (22,000) cases of malaria were treated at hospitals and dispensaries exclusive of those treated as out-dispensary patients. Of the total cases recorded 21,15 were defined as "clinical" and in 11,596 (6,881) cases the infective parasite was determined. Of the latter 10,217 (4,738) or 83.1 (88.6) per cent. were subtertian 605 (1,230) or 5.2 (19.4) per cent. tertian and 774 (793) or 6.7 (11.6) per cent. quartan. At the Medical Research Laboratory among upwards of 12,000 blood smear examined 3,069 contained malaria parasites. Of the latter 2,686 (512) or 85.3 (88.0) per cent. contained *P. falciparum* 328 (57) or 10.6 (10.4) per cent. *P. vivax* and 45 (53) or 1.5 (5.7) per cent. *P. malayensis*. At the Nairobi Clinical Laboratory 1,242 (887) specimens out of 4,849 (5,169) examined were positive for malaria parasites 1,186 (812) or 96.3 (91.4) per cent. contained *P. falciparum* 14 (11) or 1.1 (1.2) per cent. *P. vivax* 23 (44) or 1.9 (4.9) per cent. *P. malayensis* and 9 (20) or 0.7 (2.3) per cent. were mixed infections. The increase in recorded cases is partly due to the increasing tendency of Africans to seek treatment, but also to high incidence of the disease in some parts of the Colony where malaria is not hyperendemic. Two such areas are specifically mentioned, viz. the Trans Nzoia District a large rural area in European occupation and the Urban area of Nairobi, where for the past five years the numbers of cases notified were 789, 420, 838, 1,071 and in 1934 2,102. A sharp outbreak in May and June was the accompaniment of a considerable

increase in the numbers of *A. gambiae* in the Nairobi River swamp areas. At Kisumu routine control with paris green and reclamation of the lake shore have continued. The effect of bush clearing on the incidence of *A. funestus* in adjoining residential areas is striking. Anti-malarial work was continued in other areas considerable attention being paid to gold mining areas. The carriage of insects in aeroplanes has received attention and searches made in planes arriving in Kenya from north and south have produced interesting results. Blackwater fever cases numbered 45 (28) with 11 (8) deaths. In Nairobi 14 (4) cases were notified.

In the tabulated returns it is noted that 200 (123) cases of *enteric fever* were admitted to hospital 169 (91) of these relating to the general native population. Of the total cases admitted 173 were typhoid 9 paratyphoid A 3 paratyphoid B and 15 were not differentiated. There were 48 hospital deaths ascribed to this cause. At the Mombasa Laboratory out of 129 (159) samples of serum 32 (34) reacted positively with *Bact. typhosum*.

Dysentery cases numbered 1 790 (1 614) with 72 deaths all the latter occurring among the general native population [In the tabulated returns the total cases numbered 1 788]. Of the total cases recorded 752 (744) or 42 1 per cent were amoebic 279 (218) were bacillary and in 755 cases the nature of infection was undefined. 90 per cent of the total cases occurred among the general native population. Of faecal specimens (total not stated) examined at the laboratory for bacillary dysentery 26 (28) yielded strains of the Flexner group 18 (10) the bacillus of Shiga 3 (3) of Sonne and 2 (2) of Schmitz.

A few years ago plague was a disease of first-class importance in Kenya and responsible for a large number of deaths each year. Its incidence for reasons that are unknown has steadily decreased till in the last two years it has all but disappeared the decrease occurred not only where preventive measures were effective but where none were applied over wide areas. Fumigation by cyanogas employing only local native labour has proved satisfactory. During the year 128 (163) cases of plague were notified no case either rodent or human occurred in the port or in any of the larger towns.

Early in the year after sixteen years freedom from anything in the nature of an epidemic the Colony was faced with a serious outbreak of smallpox of a virulent type which in view of the comparatively susceptible state of the inhabitants might have proved disastrous. In January a case was reported from Kilifi a small town on the Coast and news received of cases in the Northern Frontier District and on the Tana River—areas sparsely populated and wherein news travels but slowly. It would appear that the infection was first introduced in December 1933 by nomadic Somalis from Italian Territory. The infection was already widespread when news first reached the Authorities and in these circumstances endeavours were concentrated upon controlling the outbreak by vaccination in the infected areas and by ensuring the safety of the rest of the Colony by establishing a barrier of immunized people. Fortunately the Laboratory was able to meet all demands made for calf lymph—it may be noted that in one day alone as much lymph was asked for as in the whole of 1933 and the demand was met the same day. Over 400 000 vaccinations were carried

out the main outbreak was speedily brought under control and the disease did not spread to the densely populated areas. Cases reported numbered 1,781 (3) and deaths 645. Transport of lymph by aeroplane on two occasions enabled vaccine to be delivered within a few hours as against two weeks by ordinary land transport.

Nineteen (28) new cases of *trypanosomiasis* were reported. The Entomologist reports important experimental work carried on with regard to the value of bush clearance and elimination of fly by trapping, hand catching and pupa destruction in Central and South Kavirondo. The reduction of tsetse was reported to be promising results suggesting the development of a technique which will enable the re-occupation of *palpalis* infested tracts economically and with safety.

According to official returns 12 cases of typhus were admitted to hospitals, and one death was recorded (in the text only 5 cases are mentioned). Hospital returns also record 95 cases of cholera with seven deaths, 61 cases of cerebro-spinal fever with 48 deaths (all general native population), 9 (6) cases of diphtheria, two of which were fatal, 5 cases of undulant fever with one death, and 124 (17) cases of relapsing fever with 4 deaths.

Pneumonia was responsible for 2,583 (1,830) in-patient cases treated at Government Hospitals, 620 (421) deaths and a case fatality rate of 23.9 (23.0) per cent. In Nairobi alone of 285 deaths due to Diseases of the Respiratory System it was noted that no less than 238 were ascribed to pneumonia. Available evidence suggests that the disease claims an unduly high toll of the lives of the population of the Colony as a whole. Of the total cases treated, 2,482 occurred among the general native population, 485 cases proving fatal. At the Laboratory the routine of typing pneumonia cases has continued, and the results tabulated and discussed in the special report of the Medical Research Laboratory (see also this Bulletin 1933 Supp. p. 39).

In the text of the Report it is stated that 345 (432) cases of typhus were under treatment during the year and that about another thousand cases were seen at out-dispensaries in one district alone, apart from many other cases which never came to notice. Such facts as these may be interpreted as conveying no indication of the general incidence of the disease but only the amount of accommodation available for treatment of cases. On the other hand, Dr Patterson inclines to the belief that if incidence were high, many more cases would be seen whereas except in a few areas, the number of cases applying for treatment is small.

Cases of tuberculosis numbered 1,145 (969) and of these 731 were of the pulmonary type of the disease. No special preventive measures are in operation against tuberculosis.

Veneral Diseases—Cases of syphilis numbered 36,521 (33,547), an increase of nearly 13,000 over the figures for the preceding year. The increase is accounted for as to 9,500 cases treated at out-dispensaries in Central Kavirondo, 1,000 cases treated at dispensaries for women and children in Nairobi, and the remainder from various areas throughout the Colony. Syphilis has long been more prevalent in Central Kavirondo than in any other district, and far from uncommon in Nairobi. Dr Patterson is inclined to attribute the increase to growing confidence in the efficacy of European medicine rather than to notable

increase in the incidence of the disease. At Government Hospitals 9,065 cases of various forms of venereal disease received treatment distributed as to 6,367 syphilis, 2,623 gonococcal infections and 75 soft chancre. Of the total 6,504 (5,959) were out patient cases of which 4,788 (4,600) were syphilis, 1,648 (1,289) gonococcal infections and 58 (70) soft chancre. The special V.D. Clinics at Nairobi and Mombasa continued to function as previously described (see this *Bulletin* 1935 Supp. p 38*) By way of contrast there was a slight decrease in the recorded cases of year 60,439 cases being treated against 61,172 in the previous year. The result is ascribed to the combined effects of specific treatment, increasing cleanliness and acquired active immunity on the part of the population.

Helminthic diseases were responsible for 34,168 (28,479) cases distributed as to *Taeniasis* 23,712 (19,007), *Ascariasis* 8,158 (7,515), *Ankylostomiasis* 1,845 (1,606) and *Schistosomiasis* 453 (351). The figures merely record the numbers of patients treated and are no indication of the prevalence of helminthic infections.

The following results of a small-scale survey among Kikuyu children are of interest —

Male Children

Age groups	Ob-served	In-fected	In-fected	As-caris	Taenia	Trichuris	Anky-lo-stoma	Oxy-uris
0-	15	7	46	6	—	—	1	—
2-	11	7	63	7	1	—	—	1
6-	39	35	89	33	2	3	—	1
11-15	39	36	89	30	5	6	4	—
Totals	104	85	81	78	13	9	5	2

Female Children

0-	43	24	55	24	—	1	—	—
2-	33	33	100	32	3	1	1	—
6-	33	31	93	29	1	2	—	1
11-15	10	10	100	9	1	—	1	—
Totals	119	98	82	94	5	4	2	1

At the Medical Research Laboratory 7,106 specimens of stools were examined ova of *Taenia* being found in 1,370 (1,153) cases, *Ankylostome* 1,057 (936), *Trichuris* 716 (759) and *Ascaris* 494 (658). At the Clinical Laboratory, Mombasa, where 5,641 (3,657) faecal specimens were examined, *Ankylostoma* were discovered in 1,662 (1,528) cases, *Trichuris* in 1,637 (1,077), *Ascaris* in 879 (830) while *Taenia* was the least common with 316 (361).

Training of African Assistants — One of the most important functions of the Medical Department for without this medical training, medical relief and instructions in hygiene can never be made available for the population as a whole on the wide scale on which it is required. Up to the present for a variety of reasons the scheme has been limited to the training of Africans to act as hospital and compounder assistants.

out the main outbreak was speedily brought under control and the disease did not spread to the densely populated areas. Cases reported numbered 1,781 (3) and deaths 645. Transport of lymph by aeroplane on two occasions enabled vaccine to be delivered within a few hours as against two weeks by ordinary land transport.

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During the year the following scientific papers were published by members of the Laboratory Staff —

TOKING, H. D. A Case of *Plasmodium Ovalis* in an East African Native — *East African Med JI* 1934 vol 11 p 166

VINT F W. The Brain of the Kenya Native — *Jl of Anatomy* 1934 vol. 68, pp. 216-223

SEGUINER J H & VINT F W. Malignant Melanoma in Africans *Brit Jl Dermat & Syph* 1934 vol. 46 pp 361-367

DAUBNER R & HUNSON J R (Dir. of Veterinary Research) and ROBERTS J I (Entomologist Medical Research Laboratory) Preliminary Note on the Transmission of Bovine Haemorrhagic Septicæmia by the Flea *Ctenocephalus felis* Bouche — *Jl Comparative Path & Therapeutics* 1934 vol. 47 pp 211-213

At the Clinical Laboratory Mombasa a total of 14 656 (12 775) specimens was dealt with of which 4,849 were bloods 5 641 faecal samples and 2,390 specimens of urine

Financial — Total expenditure sanctioned amounted to £201,876 (£215 16s) actual expenditure being recorded at £197,967 (£199,568). Actual expenditure of the Medical Department during 1934 constituted 6·2 (6·2) per cent. of the total estimated expenditure for the Colony and Protectorate.

Analyses of a series of vegetable foodstuffs and milk samples were completed by the Biochemists the results of which will be prepared for publication. An investigation was commenced in collaboration with Dr H. D. TOKING Assistant Bacteriologist on the composition of the blood of the East African native.

UGANDA PROTECTORATE (1934)

The Uganda Protectorate lies in the northern part of the Great Lakes region of Africa. It has no sea coast, being bounded by the Anglo-Egyptian Sudan on the north, Kenya Colony on the east, Lake Victoria, Nyanza and the Tanganyika Territory in the south and the Belgian Congo on the west. The area of the Protectorate is estimated at 94 204 sq miles including 13 816 sq miles of water. (The area of England without Wales is a little over 50 000 sq miles.) The headquarters are at Entebbe and the chief commercial towns are Kampala and Jinja. All three are on or near the north shore of Lake Victoria.

Vital Statistics — The estimated native population is returned as 3,558 013 the birth rate 26·1 (28·4) death rate 20·6 (18·4) infant mortality rate 188·5 (160·6) and maternal mortality rate 13·5 (11·8). These data relate to the Protectorate as a whole but the vital statistics for each province and District (with the sole exception of Karamoja from which area no returns are made) are presented in great detail. It is noted that for the whole Protectorate the total births for 1934 were nearly 8 000 lower and of deaths nearly 8 000 higher than in 1933 as in every district figures fluctuated considerably family registration may account for these changes. Infant mortality is highest in Chweu in the Northern Province and lowest in Entebbe in Buganda the annual rates being respectively 356·9 and 72·1 per 1 000 births.

The total number of European officials resident was 523 (508) with an average of 434 (397). Three (1) were invalided and there was one

(0) death from myocarditis following blackwater fever and influenza. The commonest forms of sickness were malaria, influenza, tonsillitis, digestive ailments, respiratory affections.

2,981 (1,811) cases of illness among non-official Europeans received treatment at the hands of Government medical officers. 16 deaths were recorded among which were blackwater fever 5, cancer 2, pneumonia 2. The principal causes of sickness, and in the same order of importance were the same as those noted of European officials.

Resident Asiatic officials numbered 360 (346) with an average of 321 (286). Four (6) were invalided and there were 2 (1) deaths, one being ascribed to gangrenous stomatitis and one to pneumonia. The principal causes of sickness were malaria, digestive diseases, respiratory affections, influenza, skin diseases, rheumatism, injuries.

Of African officials (African Civil Service) 121 were resident officials, the average number resident also being 121. One was invalided, and 1 death occurred within this group 1 to plague 1 to cardiac failure. The most common forms of sickness were malaria, dysentery, local injuries, plague.

Maternity and Child Welfare — A considerable extension of Maternity and Child Welfare work took place during 1934 and it is believed that infant welfare clinics will, before long, reduce the heavy infant mortality which for the whole Protectorate was 188 per 1,000 live births in 1934.

1,101 women were admitted to Government Institutions for their confinements and 979 living babies were born. There were 122 stillborn children and 67 maternal deaths. The proportion of deaths in child-birth to live births is high (68.4 per 1,000) and it may be noted also that there is an increase in the maternal mortality rate for the Protectorate from 11.81 to 13.48 these rates being calculated, however, per 1,000 live births and stillbirths. It is observed that many women were admitted to hospital in a hopeless condition after being in labour for three or four days while from more than one source, mention is made of the ecabolic drug administered to women in childbirth, a practice which is said to be responsible for a large number of these deaths. The custom is believed to be on the decline in Buganda, which has the lowest maternal mortality rate in the Protectorate.

At the Central Institution, Namirembe out-patient attendances numbered 4,800 (4,844) and there were 1,266 (1,440) new patients. In the Clinical Wards attached to the Training School, 520 (588) in-patients were admitted there were 341 confinements and 28 maternal deaths—a maternal mortality rate of 82.1 (43.1) per 1,000 births.

Returns from 22 country centres record a total of 1,033 confinements, 1,061 live births and 15 maternal deaths—a rate of 14.1 per 1,000 births. These centres also report 48,522 ante-natal visits and 9,550 attendances at the Child Welfare Clinics.

The training of midwives continues to be undertaken at the Lady Corrydon Maternity Training School, Namirembe and at the Nsambya Maternity Training School. At the former Institution 33 pupils were in training during the year and 10 were awarded their certificates after examination at Nsambya, of 29 students in training, 3 passed the Government examination.

In the Clinical Wards attached to the Nsambya Maternity School there were 150 confinements during the year and 1 maternal death—a maternal mortality rate of 7.3 per 1,000 live births. At 17 country

centres confinements totalled 1 124 6 437 ante-natal cases were seen and 1 633 children attended welfare centres. There were 13 maternal deaths recorded a maternal mortality rate of 25·6 per 1 000 live births. These figures are however incomplete for it is observed that of some or all particulars called for no returns were received from 9 of the 17 centres.

New maternity and infant welfare centres were established in various parts of the Protectorate during the year a larger number of pregnant women than in any previous year attended the centres. A still greater response was noted towards the services of established child welfare clinics than to the use of maternity centres and large attendances of African mothers seeking advice were recorded. In addition to the figures already quoted 55,593 attendances at certain other welfare clinics were noted. Where it has been possible to post European Sisters to district clinics attendances have increased and it is hoped that this side of the Department's activities may be developed still further. The Model Infant Welfare Clinic model Maternity Ward and various demonstrations which were a feature of the very successful Health Exhibition in Kampala were valuable object lessons whose influence should prove far reaching.

General Sanitation etc—In Kampala and Jinja there is a piped water supply but in the small townships and rural areas water supplies are both unsatisfactory in quality and deficient in quantity contaminated supplies are probably responsible for the high incidence of intestinal diseases. The campaign to promote better housing is bringing about improvements here and there but much still remains to be done before conditions may be regarded as satisfactory. The insanitary conditions in the congested Asiatic slum areas are aggravated by lack of suitable drainage and inadequate water supplies.

School Hygiene—Periodical visits were paid to all Schools in all districts by Medical Officers and Nursing Sisters. At a number of centres pupils were submitted to routine medical examination of these visits Dr HAUNTER observes these results reveal a truly appalling picture of ill health much of it preventable and concludes by emphasizing the need for intensive health propaganda among the schools, and the provision of adequate school medical services. The principal disease conditions noted were anaemia malaria parasites dental caries scabies syphilis and yaws.

Labour Conditions—Particular attention has been devoted during the year to the housing of labour and the general sanitation of gunneries and gunnery camps gunnery owners are now required to provide a certain minimum standard of housing for their workers. The question of night-soil disposal is acute and though various experiments are in progress, the solution of the problem has not been reached.

Hospitals Dispensaries Clinical etc—831 240 (743 719) new cases were seen at hospitals and dispensaries during the year and 33,200 (30 185) persons received treatment as in patients the distribution of the latter among the Protectorate hospitals and sub-dispensaries was as follows Buganda Province 11,863 Western Province 5 620 Eastern Province 8 457 Northern Province 7,260 New cases at the 88 sub-dispensaries numbered 548 115 and total attendances 1,378,945 (These totals are returned as 613 006 and 1 453,973 in another part of the Report.)

Malaria.—60,229 (48,702) cases with 107 (57) deaths were reported during the year. The increase in the number of cases is not interpreted as evidence that malaria was more prevalent during 1934 than formerly but rather to more accurate diagnosis, plus an increasing tendency on the part of Africans to seek treatment. Cases reported from the Eastern Province account for two-thirds of the total increase. The number of deaths in hospitals was nearly double that of last year the majority occurring among debilitated immigrant Banyarwanda labourers. The distribution of cases and deaths during the past two years was as follows.—

Year	Province								Practitioners Treat	
	Buganda		Eastern		Western		Northern		Cases	Deaths
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
1933	16,910	19	14,581	15	8,483	9	8,348	11	48,702	57
1934	16,756	37	22,767	34	9,493	24	9,013	13	60,329	82
Increase	1,846	18	7,986	16	1,110	15	665	1	11,627	25

49,506 or 82.2 per cent. of total cases treated, were returned as clinical "malaria, while among the 10,633 cases in which the type of malaria was diagnosed 1,271 or 11.9 per cent. were benign tertian, 1,374 or 12.9 per cent. were quartan, 7,597 or 71.4 per cent. were malignant tertian and 393 or 3.7 per cent. were mixed infections. Of 3,367 blood smears examined at the Pathological Laboratory 78.8 per cent. were returned as malignant, 19.1 per cent. quartan, 0.4 per cent. benign tertian, 0.7 per cent. mixed infections and 3.0 per cent. were unidentified. With regard to malaria control measures, mosquito surveys and investigations and experiments with gutters, tanks and cisterns were carried out tree-planting with a view to the drainage of swampy areas proved successful and is to be extended.

During the year 144 (146) cases of *Blackwater fever* with 39 (41) deaths were reported. Of these 85 cases with 17 deaths were treated by Government Medical Officers (37 cases, 12 deaths in hospitals) and the remainder by private practitioners. The majority of cases and deaths—123 and 32 respectively—occurred among the poorer members of the Asiatic community. 12 Europeans contracted the disease, of whom 4 died.

Trypanosomiasis—773 (693) new cases with 127 (109) deaths were recorded all were *T. gambiense* infections and no case infected with *T. rhodesiense* occurred. The disease gave rise to a little anxiety in most areas but in the West Nile District 615 new cases and 85 deaths were reported, and of these 561 new cases were reported from Ariga County alone. Following the visit of Mr C. W. CHORLEY, the Sleeping Sickness Inspector of Buganda Province, new measures of control were recommended with a view to reducing the incidence of fly and the contact between fly and man. From the Lake Edward-George area, 81 new cases from infected areas adjoining the Congo border were reported. A survey carried out by Mr Chorley revealed the presence of *G. pulchra* in considerable numbers along the shores of the Kazinga Channel, and

of Lake Edward to the southward. The problem of control in Sleeping Sickness areas is complicated by the habits of the people themselves and by wilful disregard of regulations framed for their protection.

Plague—877 cases and 937 (533) deaths were reported. Lango was the only infected district in the Northern Province, while the Western Province was free of infection. Investigations into the habits of the rat population in the Protectorate and into the alleged connexion between plague and the cotton industry were made by the Entomological Section of the Agricultural Department. Of the rats in Busoga, the Entomologist observed “An enormous proportion of the rats gassed or natives here (*Rattus rattus*) proved to have mummified feet. The cause of this condition was found to be attack by the larvae of *C. anthropophaga*, the skin maggot of man which is known to produce boils in man and particularly in children. In the areas investigated rats are the norm... but of the species. This is a fresh implication of rats as disease carriers.”

Typhus was diagnosed in the Protectorate for the first time in 1932 with an outbreak in the Kigezi District when 120 cases with 9 deaths were recorded during the year. Since then it has become apparent that the disease was not only endemic in the district, but that from time to time it assumed epidemic proportions. During 1934 a total of 103 cases—all from the Kigezi District—and 8 deaths were recorded, 88 of the cases occurring during the three months March-May. Mr W. M. CARRIE a European Sanitary Inspector was posted to the District in March 1934 and was able to devise a simple but efficient method of de-lousing skins clothes etc., by heat. The use of the Carrie delousers—described and illustrated in an Appendix to the Report see also *Bulletin of Hygiene* 1935 Vol 10 p 629—was made compulsory and following their introduction, incidence of the disease declined rapidly. It is stated of these delousers that if they were used regularly typhus would be completely eradicated.

Tuberculosis—1,007 (807) cases and 89 (66) deaths were recorded during the year of these, 909 cases and 76 deaths were ascribed to pulmonary tuberculosis. The Report suggests that the increase in the number of cases may not necessarily be entirely due to increase in the incidence of the disease but that improved diagnosis may in part account for the recorded increase. On the other hand, the Medical Officer Lango states that pulmonary tuberculosis is a severe and rapidly fatal disease among that tribe, while the Medical Officer Igizi, is of the opinion that in his district the disease is much more common than is generally supposed. An investigation into the relationship if any which exists between T.B. in Ankole cattle and people of the district was commenced. Of some 50 cases of phthisis investigated, two both cattle owners were found to be infected by the bovine strain, but of the rest none was found to be so infected. This investigation continues.

In 1932 the Bulletin observed “Helminthic infestations do not appear to be of great moment in Uganda, yet in 1934 infestations due to the presence of intestinal parasites appeared to be very common throughout the Protectorate available figures show significant increases and it must be remembered that many more cases received treatment than were recorded. *Ankylostomiasis* accounted for 1,915 cases with 26 deaths, while of 2,991 laboratory examinations for ova in Africans 1,626 or 54 per cent. were found to contain *Ancylostoma*. Cases of

Cestode infestation numbered 3,234 (2,957) and of Ascari 2,039 (1,481). *Dracunculus* was responsible for 2,028 (1,402) cases, of which 1,985 or 93 per cent. were from the Northern Province, from which area also came the majority of the 153 cases of *Schistosomiasis* reported during the year—137 *S. mansoni* and 18 *S. haematobium* infestations.

[The experiments on the control of *Dracunculus* and *Schistosomiasis* undertaken during the year and described at length in the Report, are a repetition of the investigations of Sir Robert G. Atchimato former Director of the Wellcome Tropical Research Laboratories, Khartoum. Cf. "The Use of the Fruit of the Tree *Balanites Aegyptiaca* in the control of *Schistosomiasis* in the Sudan." Trans. Roy Soc Trop Med & Hyg vol. 27 No. 2, July 1933 pp. 207-210.]

Cases of syphilis and yaws numbered 131,197 (121,784) of which 74,141 (72,218) referred to syphilis and 57,056 (49,546) to yaws. Sufferers fail to realise the necessity of regular and repeated attendance for treatment and are inclined to discontinue their visits to dispensaries once obvious lesions have disappeared. By the establishment of itinerant dispensaries it is hoped that patients may be persuaded to receive adequate courses of treatment for these ailments. There were fewer cases of gonorrhoea recorded, 9,680 against 10,702 in 1933, here again, it is noted, treatment is not persevered with to the standard of cure.

Of diseases of the skin and cellular tissues, no less than 17,257 (111,413) cases were recorded during the year and of these 49,986 or 39 per cent. of all cases in the group referred to patients receiving treatment for leprosy. These patients constitute a very special problem, and are a serious burden upon hospital accommodation owing to the length of time required for treatment.

The recorded cases of influenza 13,608, were an increase of 4,000 over the numbers returned in 1933. Of patients treated in hospital, 25 died. In Teso the incidence was high and had considerable fatality sufficient, in fact according to the report to raise the general death rate in some areas by nearly one-third.

A total of 3,617 (3,117) cases of dysentery with 7 deaths, was reported during the year. Of the total cases recorded, 53.5 per cent. were undefined, 28.3 per cent. were of the bacillary type and 20 per cent. amoebic cases. The number of cases of amoebic dysentery—the majority from the Lango and Galu districts in the Northern Province—was more than double that of 1933. This disease may be more widespread than has hitherto been realized.

Returns received from Government Hospitals and Dispensaries show that 1,557 (2,227) persons received treatment for leprosy. From most districts it was reported that the attendance of lepers was so irregular that improvement could not be expected. The successful control of leprosy in the Protectorate would appear to lie in the establishment of special leper colonies such as those maintained by Mission Authorities at Buluba, Nyenga, Banyooyil, Kumi and Ongina. The Buluba leper colony was newly opened during 1934. 60 lepers were admitted, of whom 50 remained under treatment throughout the year. At these Mission centres nearly 1,000 lepers are housed and treated.

743 (82) cases of cerebrospinal meningitis with 239 (14) deaths were reported of which 135 cases with 43 (14) deaths received in-patient treatment. The large majority of cases were due to an epidemic

outbreak in the Ankole and Kigezi districts of the Western Province in both areas cases occurred throughout the year though the epidemic appeared to be dying down towards the end of it. There were 64 (43) cases of typhoid with 17 (16) deaths reported by Government Medical Officers and 7 cases among Asians reported by private practitioners. 54 cases were treated at hospitals or by private practitioners in Kampala alone—44 *Bac. typhosum* 3 *Bac. paratyphosum A* and 6 *Bac. paratyphosum B*. No case of smallpox occurred in the Protectorate. 83 464 vaccinations were carried out during the year.

The usual statistics relating to prisoners confined in Government gaols are presented in the *Report on Prisons and Asylums*. 32 deaths occurred among convicts giving a death rate of 17.2 (18.6) per 1 000. Cases of relapsing fever are reported as usual from the Mbarara prison a very old building.

The *Laboratory Report* records the usual routine activities—no special research work having been undertaken during the year. 370 specimens exhibits etc. were submitted to the *Chemical Section* for examination 208 of these being Medical Dept. specimens. Other special Reports include those of the Government Entomologist, Government Dental Surgeon and Mulago Medical School.

Scientific—Scientific papers published during the year by members of the Medical Staff included the following—

- BARRETT R. E. Notes on the Epidemiology of Sleeping Sickness with special reference to conditions in the West Nile.—*E. African Med. J.* 1934 vol. 11 p. 20.
- HENNEKAY R. S. F. Typhus Fever in Uganda.—*E. African Med. J.* 1934 vol. 11 p. 42.
- WILLIAMS A. W. Some unusual forms of Plague.—*E. African Med. J.* 1934 vol. 11 p. 229.
- GARNET E. G. with PATTON W. S. Studies of the Higher Diptera of Medical and Veterinary Importance—A Revision of the Genera of the Tribe *Muscini* Subfamily *Muscinae* based on a comparative study of the Male Terminalia. III.—The Metallic *Muscini*—*Annals of Trop. Med. & Parasit.* 1934 vol. 28, p. 571.
- GARNET E. G. Morphological Study of Malana Pigment in Oocysts of Naturally Infected Anopheles.—*Parasitology* 1933 vol. 25 p. 428. Further Studies on Ethiopian Simuliidae.—*Trans. Royal Entomol. Soc. of London* 1934 vol. 82, p. 51.
- BAUDRICA, OMW D. (Senior African Medical Assistant). An unusual case of Draconianus.—*E. African Med. J.* 1934 vol. 11 p. 292.
- HARCOCK G. L. R. The Mosquitoes of Namanve Swamp Uganda.—*Jl. of Animal Ecology* vol. 3 pp. 204-221.
- HOPKINS G. H. E. Notes on Uganda Mosquitoes and on Methods of Control.—*Uganda Jl.* vol. 2 pp. 49-59.
- HOPKINS G. H. E. Mankind at War with the Insects. *Uganda Jl.* vol. 2, pp. 234-244.

Financial—Expenditure on medical services during 1934 totalled £140 674 (2144 156) a sum representing 9.2 (9.4) per cent. of the total revenue of the Protectorate.

TANGANYIKA TERRITORY (1934).

Tanganyika Territory consists of that part of former German East Africa which is administered under a Mandate by His Britannic Majesty. It lies between the Great African Lakes and the Indian Ocean, and adjoins Kenya and Uganda on the north, the Belgian Congo on the west & Rhodesia and Nyasaland on the south-west and Portuguese East Africa on the south-east. The total area is about 365,000 sq miles. Dar-es-Salaam is the capital and chief port, other important towns are Tanga, Tabora, Dodoma, Moshi and Arusha.

Introductory.—In the Introduction to this Report Dr R. R. Scott, Director of Medical Services, pays a graceful and generous tribute to the energy, enthusiasm and inspiration which characterized the work of his predecessor in office Dr A. H. OWEN recently retired from the Service. In this section, also Dr Scott briefly refers to the lines along which development of the medical services must proceed if the facilities already provided are to be utilized to the best advantage of the Territory. Among other matters he emphasizes the importance of raising the standard of the work of the tribal dressers, of maintaining the confidence of the population at large and of requiring that further attention and energy shall be devoted by senior members of the medical staffs towards co-ordinating the work of Government, native authority and missionary medical organizations within the boundaries of their respective areas.

Vital Statistics.—The population estimate still remains that resulting from the Census enquiry of 1931 viz. 5,022,840 and it is further observed that no reliable statistics relating to birth, death and infant mortality rates are available at present. The Registrar General of Births and Deaths submits a return of 69 (53) European deaths with distinction as to cause. The only dependable medico-statistical data appear to be those relating to European and Asian Officials, of whom the following facts are supplied.—

European Officials numbered 965 (1,132) with an average number resident of 588 (727). Eight (4) were invalidated (2 for gastric ulcer, and one each for tuberculosis, gall bladder trouble, neoplasm of neck, empyema and debility respectively). For the first year on record no deaths of European Officials occurred in the Territory.

Asiatic Officials numbered 1,152 (1,336) with an average number resident of 841 (970). Six (6) were invalidated on grounds of scatica, neurasthenia, diabetes, cardiac dilatation, new growth, gastric ulcer respectively. Three (2) deaths occurred, one due to blackwater fever, one acute appendicitis and one to violence.

The vital statistics of Dar-es-Salaam do not justify quotation at length. The crude death rate for Europeans is regarded as accurate and returned as 4.4 (5.8) but those relating to Asiatics 13.8 (10.1) and Africans 16.5 (17.2) are at present of little value. In Tanga township, eleven European births and six European deaths were recorded. Asiatic and African data are unreliable.

Maternity and Child Welfare.—This work is carried on by Government and by missionary societies the latter receiving financial grants-in-aid on undertaking prescribed responsibilities. Patients admitted to clinics for confinements totalled 3,208 (2,673) while cases treated outside numbered 33 (66). New cases (in- and out-patients) seen at

the clinics totalled 28,554 (25,485) mothers and 41,163 (42,932) children, while total attendances of mothers and children were 269,254 (292,916) and 395,648 (485,788) respectively. The Tanga clinic increases in popularity year by year admissions for confinements numbered 130 (87) and total admissions 185 (122). A very successful Health and Baby Week was held, and it is estimated 6,000 natives attended the various demonstrations.

Owing to the scarcity of literate native women in the Territory considerable difficulty is experienced in obtaining suitable candidates for training as native midwives. During the year a medical pamphlet was issued, entitled *A Pamphlet in Kiswahili on Surgical Assistance in Midwifery for use in Bukoba District*.

School Hygiene—No special section of the Report refers to this field of work. The M.O.H. Dar-es-Salaam reports that School medical inspection has suffered considerably (owing to staff shortage). In the Northern Province the M.O.H. records visits paid by the Health Officer to seven schools when improvements were suggested where necessary and refers to an examination of all scholars at Moshi Indian School no details are given. Elsewhere it is observed, "some of the native school children received dental treatment."

Public Health Sanitation etc—There are 29 executive medical and health posts providing one Government medical officer per 173,194 persons. The general health of the Territory was not affected by any very extensive outbreaks of dangerous infectious disease though the small outbreak of virulent smallpox at Tanga gave some cause for alarm. Increasing use was made of existing facilities for air travel in cases where time is an important factor.

Sanitary services have been maintained as far as possible throughout the Territory the following items call for mention—

Water Supplies—The weekly bacteriological examinations indicate that the Dar-es-Salaam supply maintains its good quality. In the Northern Province attention is drawn to the polluted water supply of Arusha Township and of the facilities this affords for the spread of water-borne disease a new piped system is under construction.

Sewerage—In Dar-es-Salaam though the need becomes more pressingly urgent funds are not yet available for the installation of a water-borne sewage system. In Tanga Township the nuisances arising from the unsatisfactory cess-pit system of sewage disposal have steadily increased an expenditure of £13,000 has been authorized for the construction of an efficient sewerage system.

Inspection of Foods Markets etc—These responsibilities receive the active attention of Medical Officers. In Dar-es-Salaam legislation is under consideration to bring tradesmen under closer control and to deal with adulteration of foods milk sampling was continued and regular visits of inspection of cowsheds made. Improvements to Tanga Market were carried out.

No classes for Sanitary Inspectors were held during the year. The importance of education in elementary hygiene is realized and numbers of coloured posters dealing with various diseases and health problems have been exhibited throughout the Territory in the hope that some improvement in the hygiene of housing and village life may result from this form of propaganda.

Port Health Work—Services were maintained at the larger ports in accordance with the requirements of the International Sanitary Convention at the 13 established stations 1,718 steamers and 4,481 dhows were inspected and given pratique during the year. Owing to shortage of staff it was not possible to replace the Port Health Officer at Dar-es-Salaam when he proceeded on leave, and his work had to be undertaken by the Medical Officer of Health. New regulations in regard to pratique are under consideration, but the work of the department urgently requires a second Medical Officer. For his Memorandum on the working of the system of International quarantine measures, Dr F. J. ADAMS, Port Health Officer of Dar-es-Salaam received the thanks of the Secretary of State for the Colonies.

Hospitals Dispensaries Clinical Returns etc.—There are 48 Government general hospitals with some 2,023 beds in addition to dispensaries not providing accommodation for in-patients. New in-patients treated at hospitals numbered 34,932 (30,680) an increase of 11·9 per cent. and out-patients 546,445 (514,917) an increase of 6·2 per cent. over the 1933 figures. It is to be noted that these figures do not include patients treated at maternity centres, infectious diseases hospitals, sleeping sickness centres etc. In addition, 69,296 cases were seen by members of the medical staff on tour 144,835 patients were treated at dispensaries staffed by African dispensers and 31,554 by missionaries supplied with Government drugs and equipment.

Including the four new Tribal Dispensaries opened during the year there are now 910 such dispensaries in the Territory 451,520 (402,011) cases being treated at these centres during 1934.

Malaria cases numbered 29,243 (35,926) and 52 (45) deaths were ascribed to this cause. According to the returns of disease and deaths (all races) the total cases in- and out-patients, numbered 41,761, and deaths 56. Of the total cases treated the infection was defined in 27,711 cases, and of these 27,312 (24,970) or 98·8 (91·6) per cent. were subtertian 378 (2,115) or 1·4 (7·8) per cent. were benign tertian, and 21 (125) or 0·1 (0·4) per cent. were quartan. Of the total malaria cases recorded 885 (642) were Europeans the type of infection was defined in 715 cases 704 (516) or 99 (95) per cent. being subtertian and 11 (7) benign tertian. Blackwater fever cases numbered 59 (37) of which 13 (9) proved fatal 24 (16) cases with 6 (5) deaths occurred among Europeans.

In Dar-es-Salaam unusually heavy rains caused flooding and the malaria rate was considerably higher than that of 1933. Heavy rains were also experienced in Tanga, where anopheline breeding and malaria incidence showed increases compared with previous years. Of the Njoro area in the Northern Provinces it was reported that the whole resident population lived in a malarious environment, anopheline house infestation was high the parasite rate in children 78·9 per cent and the spleen rate in 180 children examined, 81 per cent. In the Lake Province an extensive anti-malarial scheme near the Bokito Customs area was completed. At the Mwanza hospital 1,200 cases were treated, as compared with 484 in the previous year. The Lake Shore in Mwanza Township was cleared and resulted in considerable mitigation of the mosquito nuisance. The problem of malaria at Uta, an area of European settlement between Moshi and Arusha, is to be studied.

Throughout the Territory the usual routine control measures were maintained so far as funds permitted. With regard to the entomological survey the results of two years work appear to show that (1) The only anophelines caught in dwellings at Dar-es-Salaam showing evidence of having partaken of a blood meal were *A. gambiae* (*costalis*) and *A. funestus*. (2) After the rains the majority of mosquitoes found in native dwellings were *A. gambiae* but during the dry season *A. funestus* predominated consequently the infection rate was higher in the latter during the dry season, the converse holding good for the rainy season. Tests appear to indicate that *A. gambiae* is extremely adaptable to reaction variation (pH variations) in its breeding medium. Further investigation of anopheline bionomics continues. Other enquiries in the Dar-es-Salaam area are concerned with the incidence of *P. ovale* in the local population, and cultural methods in the diagnosis of malaria.

The problem of rural malaria in the Usambara and Pare Mountains in the Kilimanjaro and Meru areas is to be investigated, and detailed surveys of selected towns and large estates are to be undertaken. This work will follow upon the return of the Medical Officer from his study tour of malaria work in India made possible by the generous grant of a travelling fellowship by the Trustees of the Carnegie Corporation.

A Table is provided showing the *Aedes* index monthly for various stations where malaria control is attempted. The high findings at Dar-es-Salaam (3.6 for the whole town) are attributed to the unsatisfactory condition of water storage on dhows and compare unfavourably with the figures shown under Kigoma (controlled shipping area on Lake Tanganyika) where nil findings throughout the year were recorded. A medical pamphlet, *Malaria Notes on its Cause Prevention and Cure for the Information of the Public* was issued, and the following contributions to scientific literature by members of the staff are noted —

MACKAY R. A Note on Atebrin and Plasmoquine in the Treatment of Malaria.—*East African Med Jl* 1934 vol. 11 No 6

WILSON D B & WILSON (Mrs.) M. E. On the Significance of Splenic Enlargement in East Africa.—*East African Med Jl* 1934 vol. 11 No 5

Smallpox.—This disease occurred in epidemic form in three areas total cases recorded being 411 (626) with 37 (38) deaths. The outbreak in the Iringa Province was not of a virulent type only 10 deaths being recorded among 314 cases. At Igalula, near Tabora 26 cases were reported with 2 deaths. The Tanga epidemic on the other hand was of a particularly virulent type and 25 deaths occurred among 68 cases. The source of infection was not accurately traced, though illicit dhow traffic was suspected. The usual measures were taken in all affected areas with success 934 620 doses of vaccine lymph were distributed among 38 districts in the eight Provinces.

A major but localized epidemic of influenza occurred in Dodoma District no accurate return of the number of cases was possible but the number approximated 2,600 and recorded deaths in this area 481 (later investigation showed that cases of virulent anthrax probably contributed to the severity of this outbreak). A small epidemic was reported in the Mbeya district 10 deaths occurring among approximately one hundred cases.

Eighty three (80) cases of *exanthemic fever* were treated in Government institutions and 13 (13) deaths recorded. Of the total cases 68 (77) were typhoid fever 16 (1) paratyphoid A, and one (1) paratyphoid B. Sporadic cases of the disease were reported from different parts of the Northern Province and attention is again called to the risks attaching to the polluted water-supply of Arusha (see also Public Health above). *Dysentery* was responsible for 1,548 (1,421) cases, the type of infection being determined in 902 cases, of which 783 (756) or 84.6 (83.7) per cent were amoebic, and 139 (147) or 15.4 (16.3) per cent were bacillary.

No case of plague, cholera or yellow fever was recorded during the year. At Dar-es-Salaam 23,332 (20,664) rats were trapped 2,968 were examined for *Pestis pestis*—all were negative.

Relapsing Fever cases again showed an increase with 1,200 (1,171) and of these 5 (11) were fatal. The Medical Officer Lake Province, reports the disease as being "very widespread." An outbreak of *cerebrospinal meningitis* occurred in the Buckoba district, when 54 (3) cases with 13 (0) deaths were recorded. (Hospital returns record 13 cases and 7 deaths.) Other infectious diseases quoted in Hospital returns are measles 431 (704) cases whooping cough 343 (1,089) cases rachitis and other sequelae of vaccination (infective) 629 cases, no deaths being ascribed to any of these causes. Venereal with 648 (850) cases and mumps with 207 (530) cases had each a single fatal case.

Data assembled at upwards of 60 stations in the Territory and relating to the incidence and fatality of tuberculosis record 2,475 (2,168) cases of which 1,784 (1,344) were pulmonary total deaths numbered 92, and of these 79 were due to phthisis. In the Hospital returns total cases numbered 1,292 (1,472) of which 977 (1,046) were pulmonary. The tuberculosis unit on Kilimanjaro dealt with 1,353 cases the use of collapse therapy being extended with excellent results. With £250 contributed by the Kilimanjaro Native Council, two new wards were erected to replace the former mud and wattle buildings.

Through the generosity of the Trustees of the Carnegie Corporation, Dr Wilcocks' Tuberculosis Research Officer was enabled to complete an extensive course of study in England, Paris and Vienna, devoting particular attention to the bacteriology of the disease, and the pathogenicity of the acid fast bacilli found in East African natives. Since his return these studies have been continued and, aided by a grant from the Colonial Development Fund, his programme of future work will include—

A more thorough examination of all cases in which acid-fast bacilli other than tubercle bacilli are found.

The retesting of cases in which guinea-pig inoculation has already proved negative.

An attempt to differentiate between acid-fast bacilli by staining reactions.

Examination of specimens of air, soil and water for acid-fast bacilli.

An attempt to culture leprosy bacilli and an examination of the question of tuberculosis in leprosy cases.

Examination of the pathology of tuberculosis in natives by post-mortem of cases which die of any disease in Moshi hospital.

Extension of tuberculin tests.

Further surveys of communities and contacts and re-examination of those previously examined.

Experiments on animals with a laboratory culture of BCG from Cambridge.

Examination of houses and the use of house dust for animal inoculation
Talks and demonstrations with influential natives.

Travelling through various districts of the Territory making a survey
of tuberculosis by diagnosis of cases and by tuberculin tests. This pro-
cedure will indicate those areas in which the disease is most prevalent.

In the Lake Province the Medical Officer observes occasional cases
of advanced pulmonary tuberculosis are met with but just how wide-
spread the disease may be is not known. He inclines to the belief
that some unknown factor modifies the course of the disease, for he
adds, "certainly tuberculosis does not appear to be so devastating
economically as it is in Europe."

Leprosy—Government continues to control settlements at Dar-es-Salaam, Moshi and Mkalama treatment centres at the medical stations
and a number of small old-established non treatment settlements in
various parts of the Territory the number of cases segregated being
3 408. In the Hospital Returns 576 (814) cases received treatment
during the year and 10 (7) deaths were recorded. Facilities for bac-
teriological examination are limited, and classification of cases not
generally possible. At the Dar-es-Salaam laboratory of 253 nasal and
skin smears examined for presence of *M leprae* 170 were positive.

Cases of venereal disease treated in Government institutions totalled
35 000 (31 704) distributed as to 24 891 (22 137) cases of syphilis
10,074 (9 477) gonococcal infections and 70 (90) soft chancre. [In the
text of the Report cases of syphilis are stated to number 24,891 in one
place and 33 701 in another]. Total deaths recorded were syphilis 23
gonococcal infections 8. Cases of jaws treated at Government
institutions and at missions receiving grants in aid were 117 884
(109 113) and of the total 81 908 (72 076) cases were treated in Govern-
ment institutions where 8 deaths were ascribed to this cause.

Of *trypanosomiasis* 1 475 cases were diagnosed and 397 deaths
recorded as compared with 2 304 cases and 478 deaths in 1933 of the
totals 1 078 (1 621) cases and 282 (347) deaths occurred in the Western
Province—the only case occurring in the Province since 1930 when
also a single case was notified. Both *G morsitans* and *G pallidipes*
are found just south of Utete but along the river bank *G brevipalpis*
has hitherto been the commonest species met with. A northern exten-
sion of the disease from this area would threaten Dar-es-Salaam
district. Following discussion of types of country in the district
providing suitable habitat for *G brevipalpis* and *G pallidipes* the
Report considers the possibility of maintaining a fly free zone round
Dar-es-Salaam Township.

Labour recruited from country bordering on sleeping sickness areas
in the Western Province are quarantined at Kigoma and detained for
14-30 days for the purpose of detecting the presence of trypanosomes
in their blood.

The medical pamphlet, *Memorandum on Sleeping Sickness
Measures* by Dr G MACLEAN was distributed during the year

Research work at the Tinde Laboratory was continued experiments demonstrated the infectiveness to man of a strain of *T. rhodesiensis* taken from man and transmitted through animals (mostly elk-els) and tsetse for a period of one year. The following scientific papers were published—

- Conson J F Latent Infection of *Trypanosomes brucei* in a White Rat.—*Jl Trop Med & Hyg* 1934 Jan. Vol. 37
- Direct and Cyclical Transmission of *Trypanosomes rhodesiensis* through Guinea pigs. A comparison of the Reaction to Normal Human Serum.—*Jl Trop Med & Hyg* 1934 April Vol. 37
- A Further Note on a strain of *Trypanosomes brucei* from Zekhed.—*Jl Trop Med & Hyg* 1934 May Vol. 37
- The Cerebro-spinal Fluid of some small Antelope Infected with *Trypanosomes rhodesiensis*.—*Im. Trop Med & Parasit.* 1934 Mar. Vol. 28.
- The Infectivity of *Trypanosomes rhodesiensis* in Relapses after treatment with Bayer 205.—*Im. Trop Med & Parasit.* 1934 Mar. Vol. 28
- The Action of Bayer 205 on *Trypanosomes rhodesiensis* in White Rats infected by Tsetse Flies.—*Im. Trop Med & Parasit.* 1934 Dec. Vol. 28.
- The Influence of the Dose of *Trypanosomes* and of the Body Weight in Experimental Infections of White Rats with *Trypanosomes rhodesiensis*.—*Im. Trop Med & Parasit.* 1934 Dec. Vol. 28
- Resistance of White Rats to Infection with *Trypanosomes rhodesiensis* through eating Infected Tissues of Rats.—*Im. Trop Med & Parasit.* 1934 Dec. Vol. 28.

FAIRBAKES H Lange's Colloidal Gold Reaction and the Estimation of Total Proteins in the Cerebro-spinal Fluid of Rhodesian Sheep Sickness and their Significance in Prognosis.—*Trans. Roy Soc Trop Med & Hyg* 1934 Mar. Vol. 27

The incidence of Admuntic diseases in the Territory is exceedingly high, accounting for 19 per cent. of all diseases, and 34 per cent. of all deaths in Government institutions. Total cases numbered 40,000 distributed as to taeniasis 14,290, ankylostomiasis 13,099, ascariasis 7,965, schistosomiasis 3,971 and other diseases due to helminths 1,291. Deaths numbered 174 of which 155 were ascribed to ankylostomiasis and 15 to schistosomiasis. Tapeworm and roundworms are especially prevalent in the Northern Province. The Director of Veterinary Services reported that *Cysticercus bovis* incidence was particularly high in certain cattle-grazing areas used by the natives for defaecation, thus encouraging the continued incidence of infection in man. In several areas in the Northern Province three types of snail capable of acting as intermediaries in the propagation of schistosomiasis have been found experiments with the seeds of *Balanites aegyptiaca* are being carried out in this and other Provinces.

Minor degrees of malnutrition are believed to be widespread though hospital figures give no indication of the incidence of diseases of nutrition 118 cases of a disorder resembling rickets 88 cases of scurvy and 28 cases of beri-beri were recorded. At this point it may be convenient to mention the title of a paper contributed by Dr R. E. SCOTT Director of Medical Services, "A Note on the Preparation of Maize Flour by Natives in Tanganyika Territory" which appeared in the *South African Medical Journal* June 1934.

Diseases of the Respiratory System with 68,234 cases provided for over 11 per cent. of all cases treated in Government hospitals of these 1,699 were pneumonia cases (including broncho-pneumonia) with 254 deaths.

Training of African Personnel—Concentrated attention was devoted to the improvement of technical training and to improving the efficiency of the tribal dressers who form the lowest grade of independent medical units. The Laboratory Staff at Dar-es-Salaam take an active part in the scheme of training regular courses of lectures and practical demonstrations being given throughout the year in addition to the refresher courses arranged for African dispensers.

Scientific—The Report of the *Laboratory Division* discusses the combined activities of the laboratory at Dar-es-Salaam and the Vaccine Lymph Institute at Mpwapwa. Shortage of staff and other disturbances combined to interrupt progress in the Laboratory Section and made it necessary to limit activities to the barest essential routine while the shortage of an analyst and temporary closing of the Vaccine Lymph Institute disorganized normal work. Routine work comprised the examination of 14,416 (15,722) specimens. Of 4,535 (5,627) blood films examined, 1,522 (1,380) contained malaria parasites 1,535 (1,672) faecal specimens were positive for ankylostome ova in 600 (655) cases and flagellates or other helminthic ova in 205 (207) cases. On one occasion only was *E histolytica* seen. In 278 (400) specimens of urine 98 (127) were positive for *S haematobium* 97 being specimens from African patients. Wassermann tests were carried out with 454 (445) sera, and 9 (16) spinal fluids and Kahn tests with 473 (334) sera.

Agglutination tests were applied to 116 sera and it was noted that one positive agglutination of *Br melitensis* occurred in the serum of an African from Tanga. Dr Wilson of the Vaccine Lymph Institute also reports the serum of a cow suffering from contagious abortion agglutinating both *Br abortus* and *melitensis*. These surprising findings are to be the subject of special investigation meanwhile *Br abortus* agglutination has been added to T.A.B and *Br melitensis* in the routine performance of the Widal test.

Samples of water were bacteriologically examined at weekly intervals throughout the year. Analyses of milk samples foodstuffs etc. were continued as formerly. Special investigations were practically at a standstill no comprehensive research could be undertaken with the limited and changing staff. An interesting reference is made to the collection of information concerning native medicines and poisons, and short descriptions of a few of the more interesting specimens collected during the year are supplied. First results suggest that some of these plants might be worthy of clinical study.

Financial—Approved expenditure for the year under review was £198,004 (£210,659) and actual expenditure amounted to £187,777 (£190,725). The Colonial Development Fund contributed £9,346 (£8,507) allocated as follows Malaria Research £6,737 (£6,507) Tuberculosis Investigation £916 (£884) and Sleeping Sickness Research £1,673.

NYASALAND PROTECTORATE (1934)

Nyasaland Protectorate consists of a strip of land about 520 miles long by 50 to 100 miles broad lying to the west and south of Lake Nyasa. Its neighbours are northern Rhodesia to the west, Tanganyika to the north and north-east and Portuguese East Africa to the south. Its total area is approximately 37,596 sq. miles of land and 10,353 sq. miles of water and its chief towns are Blantyre, Limbe and Zomba (the headquarters of the Government).

Initial Statistics—The 1934 estimate of the general African population numbered 1,800,713 persons, indicating a slight increase over the figures returned as a result of the 1931 census. Although the registration of births and deaths is not compulsory the experiment in registration introduced among the native population in the Fort Manning District has been continued with successful results. From the data available from this limited area comprising a population of some 35,500 souls, the crude birth rate is stated to be 62.6 (68.2) per 1,000, the crude death rate 27.7 (25.8) per 1,000 and the Infant Mortality Rate 154.6 (97.3) per 1,000 live births. How far these figures represent conditions throughout the Protectorate as a whole, or are peculiar to the Fort Manning District alone it is not possible to determine. During 1935 the registration experiment is to be extended to include the Karonga district among a population differing in tribal habits and customs and in geographical situation from the Fort Manning people when data are available comparisons between the two districts may reveal some interesting details.

The Asiatic population appears to be steadily decreasing, the figures for 1934 reading 1,401 as compared with 1,474 in 1933 and 1,583 in 1932. Among this population group, 49 births and 16 deaths were recorded during the year resulting in crude birth and death rates of 34.28 per 1,000 and 11.42 per 1,000 respectively.

The numbers of the general European population have also declined during the past four years, for the census returns of 1931 gave 1,973 as the enumerated population this figure having fallen to 1,800 in 1934. 40 births were recorded and 13 deaths, the resulting birth and death rates for the year being 22.2 per 1,000 and 7.22 per 1,000 respectively. Resident European officials totalled 276 (282) the average number resident being 205.7 (202.6). Seven European officials were invalidated out of the service during the year as against 10 in 1933.

11 deaths occurred among a total of 1,979 native officials, as compared with 18 in a population of 1,979 in 1933 three of the deaths were ascribed to pneumonia, and one to each of eight other causes.

Infant Mortality—Reference has already been made to the Infant Mortality Rate in the Fort Manning District in which area the civil registration experiment has been applied. From the data available infant mortality appears to be definitely affected by seasonal influence—an increase in the dry cold period from March to September followed by a decided fall during the wet season which occurs from October to February the ratio of deaths, wet to dry seasons respectively is approximately as 1 : 33. The data relating to infant mortality are, however but scanty and fragmentary and apply not to the whole territory but only to the limited area to which reference has been made. There is little doubt but that infant mortality rates are unduly high throughout the Protectorate yet the Medical Department is practically

stitute of the means of attacking the problem with a view to improving existing conditions. Quite apart from the absence of sufficient and dependable data indispensable to the framing of reformative schemes, with the exception of the native hospital at Zomba where one European Sister is posted no European women are employed by the Department on nursing or health duties in connection with the general African population.

[Despite the numerous difficulties which so far have combined to make the introduction of compulsory civil registration throughout the Protectorate impossible it is gratifying to note how widespread is the interest in and what active attention has been devoted to vital and medico-statistical enquiries by the Central Health authorities and by individual medical officers.]

Medical Surveys were carried out in Blantyre Fort Johnson Cholo and Karonga districts and at the Jeanes Training School Zomba the results of these enquiries being presented in detail in the Report under review. In this connection it may be mentioned that Dr. WATSON in the Dedza District by kind permission and co-operation of the White Fathers and while making a Medical Survey of the Ntakataka Mission School, was able to compile a mass of interesting vital facts from the Registers maintained by the Mission Authorities and covering the period 1919-1934 even allowing for the incompleteness of available data the conclusions resulting from this investigation were found to bear a close resemblance to those of the Fort Manning district. The data available from the several surveys are scarcely comparable by reason of the fact that no uniform scheme of enquiry was followed by investigators. Still the results appear to have been so encouraging that arrangements have been made for medical surveys to be carried out during 1935 in all districts in which Medical Officers and Sub-Assistant Surgeons are stationed for the 1935 enquiries a uniform system of assembling and tabulating data is to be adopted. [The value of such enquiries as preliminaries to the ultimate introduction of vital registration in different areas of the Protectorate can scarcely be over-estimated. Intensive enquiries of small areas or even of single villages are not only likely to produce accurate records also but the close personal contacts which characterize such schemes of survey provide admirable opportunities for accustoming natives to the *routine* requirements of officials serve to dissipate feelings of suspicion and native reticence and with the gradualness of time will develop among the people those habits of declaration of prescribed facts so necessary to the establishment of sound and efficient registration.]

Hygiene and Sanitation — So far as limited funds permitted, Medical Officers sought to visit their districts in order to gain first-hand knowledge of conditions obtaining in rural areas and during these tours the opportunity was taken of preaching the gospel of hygiene and sanitation. Instruction was given in various areas in simple sanitary measures the lay-out of houses and quarters the disposal of sewage and rubbish, the control of water supplies, how helminthic infections pass from man to man and so on.

The sanitary problem in the large townships and smaller stations is a very urgent and pressing one while in the rural districts its solution becomes still more difficult by reason of the fact that both funds and staff are almost entirely lacking. That conditions as revealed by the

Report are deplorable in almost every instance is scarcely surprising when it is realized that while the native population of the Protectorate numbers upwards of a million and a half souls, the sanitary personnel responsible for dealing with this population comprises but 2 European Superintendents and some 16 or 17 inadequately trained native sanitary inspectors. If conditions are to be improved, the remedy would appear to lie in the provision of further European technical personnel, trained in sanitary science, and the more frequent inspection, supervision and further training of the native subordinate staff. Financial conditions during 1934 again made it impossible to increase either the European or African sanitation staff.

Yet in spite of manifold difficulties much valuable work has been accomplished during the year. By the end of the year in Zomba, 28 water closets (septic tank system) had been constructed and were in use while 19 others were approaching completion. Disposal of night soil and refuse was placed on a more hygienic basis, the old system of disposal by burying in the compounds of residential quarters being completely abandoned and replaced by a system of deep disposal pits fitted with fly proofed covers. In Blantyre native housing has received the considered attention of the authorities who are concerned with the development of the native location at Napier. Work has been pushed forward in connection with the provision of adequate and satisfactory water supplies when all projected schemes are completed, the supply should meet all demands for many years to come. In all areas inspections for the detection and abatement of mosquito breeding places and other routine duties continue to be carried out.

The fly nuisance a problem with which the authorities throughout the Protectorate have been associated for many years, and one which is a potential source of danger to the general health of communities, is by no means easy of solution, despite the intensive campaigns against fly-breeding which are conducted with energy. Intimately bound up with this problem occurs the great difficulty of eradicating the native habit of promiscuous defaecation in any spot presenting the slightest cover or concealment. The only practical method of dealing with these problems is to have an effective sanitation system, but though during 1934 good progress has been made in this direction, much more remains to be done before conditions can be regarded as reasonably satisfactory.

Maternity and Child Welfare — For financial and other reasons the Medical Department is unfortunately reduced to taking a somewhat inactive part in this important branch of Public Health work. Mission centres subsidized by the Government, as well as other institutions not State-aided, are almost entirely responsible for any progress that has been made. From their reports it is clear that real interest in the work is being displayed by the native, and slowly but surely the confidence of the women (always the last to respond to the invitations of civilization) is being gained. Mission Clinics are established at Blantyre, Bandawe, Mkhoma, Mlanda, Kota Kota and at the Jeanes School near Zomba. Dr WILLIAMS' pressing recommendations include the provision of European nursing and health sisters for the larger towns and hospitals, and the appointment of at least one Lady Medical Officer trained in Child Welfare work.

Hospitals and Dispensaries.—Two hospitals for the treatment of European patients are maintained by Government at Blantyre and Zomba, some 42 miles apart during the year 188 in-patients (3 deaths) and 1,308 out patients received treatment at these centres. *malaria*, *dysentery* and *respiratory diseases* figuring prominently among the list of causes. With the assistance of the Colonial Development Fund 12 new hospitals for the treatment of native patients (Africans and Asiatics) have been constructed and taken into use while three other hospitals have had additions made to them there are now established throughout the Protectorate, 21 hospitals providing treatment for native in and out patients. Total African and Asiatic in patients treated during 1934 numbered 9,044 (200 deaths) and out patients 114,805. *malaria*, *influenza*, *venereal diseases*, *diseases of the eye* and *various respiratory diseases*, *ankylostomiasis*, *schistosomiasis* and *diseases of the skin* appear to have been the most frequent causes of ill-health. The Report contains clinical notes and photographs relating to interesting surgical cases on the difficulties encountered in the country in obtaining satisfactory anaesthesia and on the technique and results of Evgan Sodium anaesthesia. The Rural Dispensary System comprises some 92 dispensaries which serve as treatment centres for minor ailments 261,047 (238,340) cases received attention at these centres during 1934.

In the Report, four tables are devoted to the presentation of Hospital and Rural Dispensary data in some detail [in these tables it is noted that though diseases are tabulated by sex for out patients this practice is not adopted for hospital in-patients.] As regards morbidity and mortality experience during the year the following items are selected for comment.—

Malaria.—The numbers of women and children (wives and children of personal servants) residing in the compounds of official and private residences constitute a source of very real danger to Europeans living in close proximity to such natives for it has been shown that children are particularly dangerous as carriers of malaria and that both children and adults are to a considerable extent parasitized by helminthic and protozoan infections. The problem is being tackled by the authorities yet Dr WILLIAMS reports In the smaller stations especially along the lake shore and on the Shire River official houses are partially mosquito-proofed only and, so far as is known no Government house has yet been built which is properly and efficiently gauzed and rendered proof against mosquitoes.

During the year under review 6,584 patients received treatment at Government hospitals while 8,233 cases were treated at Rural Dispensaries. In-patients totalled 760 of which 35 were Europeans two European deaths (one due to Blackwater fever) and 13 native deaths were recorded—no deaths ascribed to *malaria* occurred among Asiatic residents in the Protectorate. Of the 13 cases of blackwater fever recorded (Europeans 5 Asiatics 4 Natives 4) seven occurred along the Lake Shore and the Shire River 249 Europeans received out-patient treatment at Government hospitals for malaria, the distribution of types of infection being—subterian 36 per cent. benign tertian 11 per cent. cachexia 2·0 per cent. quartan 0·4 per cent. undefined 48 per cent. Among 5,575 native out patients in 62 per cent. of the cases

type of infection was not defined of the remainder 21 per cent. were subtropical and 12 per cent. benign infections, while 3·4 per cent. were suffering from cachexia.

The valuable results of the medical surveys mentioned above should be read in detail with particular reference to the interesting data relating to the examination of random samples of children in different areas. In connection with these surveys it may be noted that of blood films examined in two villages in the Mlanje district 24 per cent. were positive (*P. falciparum* present in 58 per cent. of these cases). In eight villages on the Lake shore of the Fort Johnston district positive findings ranged between 51-64 per cent. all parasites being of the subtropical variety among the inhabitants of Mangoni village in the Cholo district malaria parasites were found in 41-63 per cent. of cases examined, 28·5 per cent. of these containing *P. falciparum*.

There was a further decline in the number of cases of *syphilis* reported during the year 7 only against 12 for 1933 and 21 in 1932. In none of the 7 cases was the type determined by laboratory investigation. 2,383 cases of *dysentery* were recorded in hospitals and rural dispensaries during the year. Of the 87 European cases, 79 were defined as amoebic. 541 cases were treated at native hospitals, and of these 344 were amoebic, 39 bacillary and 159 undefined. The type of infection was not defined in the remaining 1,765 cases reported from rural dispensaries. A most interesting review of the incidence of and history of amoebiasis in Zomba with special reference to European cases prepared by Drs. Austin and Mayoux is given as an appendix to the Report [see this Bulletin 1933 v. 33 537-8.]

Influenza was responsible for approximately 28 per cent. of the total incidence of epidemic, endemic and infectious diseases, reported throughout the Protectorate during the year. 8,946 cases of the disease, of which 8,893 were native patients, received treatment at Government hospitals and rural dispensaries during the year.

There was a notable decrease in the number of cases of *smallpox* reported during 1934. 814 cases with 24 deaths occurred as compared with 3,412 cases and 96 deaths in 1933. The control of the disease is rendered especially difficult by reason of the invasions of alien labour —particularly from Portuguese Territory where the disease is endemic—seeking employment within the Protectorate. One of the principal areas affected was the Mlanje district whose boundaries march with the Portuguese border. 280,203 vaccinations were carried out during the year.

Helmintic infections continue to be responsible to a considerable extent for the ill health of the native population and special efforts are being directed towards the education of the natives in the use of latrines and to the control of promiscuous defaecation in the bush and in bathing places and pools. 4,221 cases (11 deaths) were treated for hookworm in hospitals and 3,408 in rural dispensaries, while hospital records show that 88 per cent. of the natives attending hospitals are infected with ankylostomias. It is stated that 4,996 cases received treatment for schistosomiasis though the returns from hospitals and rural dispensaries indicate that the figure should read as 5377. The results of special medical surveys show that 21 per cent. of urines examined at Jeanes Training School Zomba, contained ova of *S.*

haematobium 33 per cent at Mangozi Village in the Cholo district and 25 per cent at two villages in the Mlanje district the Government Pathologist further reports that of the specimens of urine from natives submitted for examination at the Medical Laboratory 22 per cent contained ova of *S haematobium*.

5 cases of *trypanosomiasis* occurred during the year (no deaths) compared with 32 cases in 1933. 4 of these cases occurred in the only endemic area in the Kota Kota district the fifth case being that of a native who came from Portuguese Territory and who had passed through a fly belt some five months previous to his admission to hospital. In a separate appendix to the Report Dr W. A. LAMBORN describes his tsetse-fly surveys in the Northern Province.

At the 12 leper clinics administered by Missions 182 patients (128 males 54 females) received treatment while 25 leprosy deaths occurred at these centres during the year these clinics are in receipt of money grants from Government in proportion to the numbers of cases treated. In addition to the above 66 native inpatients and 151 out patients received treatment at Government hospitals and 151 cases at rural dispensaries. Only 1 European (male) out patient case was reported and it is interesting to note that under treatment all signs and symptoms of the disease disappeared.

Other diseases to which reference is made include *tuberculosis*, *syphilis*, *gonorrhoea*, *relapsing fever*, *years*, *cerebrospinal meningitis* and *undulant fever*. [Here it should be mentioned that some little difficulty is experienced in accounting for the number of cases mentioned in the text and the numbers reported in the returns of hospital in and out patients which find a place in the Report. For example it is stated that for the first time in this Protectorate two cases of undulant fever were reported in the Blantyre district yet Table V records 3 European patients admitted to Blantyre European Hospital, while Table VI makes mention of two European out patients treated for the same disease. Of tuberculous the record of all forms of this disease treated at hospitals speaks of 228 cases treated in 1934 though hospital returns quote upwards of 300 cases. It is stated that during the year under review 2,683 cases of years received treatment though these figures appear to disregard the 107 inpatients admitted for this cause. 197 cases of relapsing fever are said to have been reported during the year though later we may note that 258 new cases were admitted to hospital, 197 out patients received hospital treatment and 35 cases received attention at rural dispensaries. No doubt these and other numerical discrepancies are capable of simple explanation though the uninformed reader is confused by apparent contradiction of recorded facts.] 42 cases of *pellagra* are noted, of which nearly half occurred among the inmates of the Central Prison. The single case of *spleno-medullary-leukaemia* reported by Dr W. L. GORSILL in the Cholo district calls for mention not only because the condition is rarely met with in Nyasaland, but also for the remarkable pathological features distinguishing the case—ova of *ancylostoma* and *ascaris* were present in the faeces, eggs of *S haematobium* were present in the urine one month after admission to hospital cysts of *E histolytica* were found in the urine, while a nodule in the skin on excision revealed the presence of 0 notules.

The Appendices—In addition to the valuable review of the incidence of amoebiasis in Zomba, contributed by Drs. Austin and Mayne as an appendix to the annual Report and to which brief reference has been made above the reports of Dr W. A. LAMBORN the Medical Entomologist and of Dr H. M. SUTCLIFFE Pathologist in charge of the Medical Laboratory call for mention. Dr Lamborn carried out extensive *tsse-tse fly* surveys in the Northern Province in May and again in December 1934. Flies were found to be swarming in the neighbourhood of Salima as they were when the Sleeping Sickness Commission of the Royal Society visited the area over 20 years ago. Here and in other places where the presence of the insects was noted, bush-tiring at a favourable season was recommended. In March 1934 Professor J. G. THOMSON of the London School of Hygiene and Tropical Medicine arrived in the Protectorate and for 4½ months he and Lamborn were engaged on a joint investigation of the malaria problem so far as it concerned Nyasaland and on experimental work concerned with the mechanical transmission of pathogenic protozoa by non-biting haemaphagous muscidae. The results of the malaria enquiries are awaited with interest but as regards the work on the protozoa it was found possible to publish a short preliminary account of the investigation (*B.M.J.*, *Jl* 1934 Aug 8 Vol. 2, p. 206).

As to work at the Medical Laboratory Dr H. M. Sutcliff reports that routine work was unusually heavy upwards of 4,000 specimens being examined, an increase of over a thousand compared with the figure for 1933. Reference is made to the investigation concerning the pharmacological actions of various reputed medicines and poisons liquid extracts of the plants concerned were prepared, the action of the extracts being subsequently tested on the tissues and organs of frogs.

Financial—Medical expenditure for 1934 was £19,139 4s. 3d., and is an increase of £3,740 13s. 8d. over 1933 expenditure, and representing approximately one-eighth of the total revenue of the Protectorate. From the balance of the Colonial Development Fund contribution, approximately £350 was devoted to the provision of X-ray apparatus and other items of equipment for the new native hospital at Zomba.

ZANZIBAR PROTECTORATE (1934)

Zanzibar Protectorate off the East African Coast comprises the islands of Zanzibar and Pemba and the islets within their territorial waters. Zanzibar is about 53 miles long by 14 miles broad with an area of 640 sq. miles. Pemba, to the north-east of Zanzibar is about 42 miles long by 14 miles broad. The only town of importance is Zanzibar Town.

Vital Statistics—The estimated population was returned as 244,104. During the year 4,466 births and 4,287 deaths were recorded, the resulting crude birth and death rate being 18.3 per 1,000 and 17.8 per 1,000. These rates mean little in a mixed population such as exists in Zanzibar and where registration cannot be regarded as effective. In these circumstances it becomes both difficult and dangerous to attempt any assessment of the vital trend of the various races concerned. The general impression seems to be that Africans and Arabs are decreasing

in number. It is noted that as no inter-censal estimates of the population of Zanzibar Town Zanzibar District or Pemba District have been possible birth and death rates for these areas for each of the four years 1931-34 have been calculated on the basis of the 1931 census figures. With a view to the assembly of reliable information detailed investigations amongst selected and limited communities are being carried out and the results of these enquiries will be awaited with interest.

Among the 100 resident European Officials no deaths were recorded during the year neither were any invalidated. The total resident non-European officials numbered 421 (535) the average number resident being 378.5 among these 3 (1) deaths were recorded and 1 (4) invalidated. *Malaria* and *influenza* were the causes of sickness most common among both European and non European officials.

Maternity and Child Welfare—There are no Government Institutions devoted primarily to this branch of work a yearly subsidy is paid to the Zanzibar Maternity Association which undertakes these services. 130 expectant mothers were admitted to the Mwembeladu Maternity Home and 355 received attention at the five Rural Maternity Centres No maternal or infant deaths were recorded during the year. There were 43 153 attendances at the Clinic attached to the Home of which 15 170 were ante or post-natal visits. The Rural Maternity Homes established by the Association are to be taken over by Government from the beginning of 1935.

School Hygiene—While no serious investigation into health conditions of school children has been undertaken particulars of 1 069 school children examined by Medical Officers in Zanzibar Town Zanzibar District and in Pemba were recorded. Among other conditions it was noted that 40 per cent. of examinees showed enlarged tonsils and adenoids 36 per cent were lacking in cleanliness enlarged spleens were evident in 33 per cent of cases and 19 per cent harboured intestinal parasites. It is of interest to note that the splenic index appeared to be much the same for town children—except Indians—as for those living in areas where malaria is hyperendemic. As Zanzibar Town is believed to be free from malaria for most of the year this result was unexpected. The rate of infestation by intestinal parasites varies considerably in different schools—perhaps by reason of the fact that in town schools the children receive periodic treatment whereas in country schools little or nothing has been done. In Pemba clinical *schistosomiasis* was almost universally present among the school children few of whom in the opinion of the Medical Officer at Chake Chake can hope to escape the disease. Investigations into the infection rate of this disease are to be undertaken during 1935.

At the special school clinic for Zanzibar Town schools 4 039 new cases were seen and 7 633 re attendances recorded constipation minor injuries dental caries and digestive troubles were the principal complaints dealt with.

Hygiene and Sanitation—1934 saw the appointment of a Malaria Research Officer whose duties were to investigate the incidence of malaria in the Protectorate particularly with regard to townships and to advise on measures for the improvement of the existing situation various recommendations already made will be followed later by more (cont.)

comprehensive schemes for dealing with swampy areas and areas outside the town boundary. As a routine measure standing water is oiled or sprayed with Paris Green once a week, regular inspections with the discovery of mosquito breeding places are undertaken, etc.

There are no sewage disposal works nor is any provision made for treating sewage except at one or two public latrines and some houses in Zanzibar Town which are provided with septic tanks. The several systems in use in towns in the Protectorate for the disposal of sewage are described as "unsatisfactory" and of a "make-shift nature, and that although a public water-borne sewage system must be contemplated in the future the primitive nature of most of the people, their habits and superstitions make it a matter of speculation as to whether a water-borne system could succeed, for only a small proportion of the population would appreciate the value of such an innovation. The water supply for Zanzibar Town is said to be the finest in Africa, and, in the rural districts of Zanzibar and Pemba, generally of a fairly good quality when derived from deep wells. The Chale Chale supplies have been chlorinated with satisfactory results, but the Wete water is untreated.

As to Refuse Disposal and Scavenging in country districts, refuse may be just left to accumulate around houses, burnt, or buried often little systematic refuse disposal is attempted, and as a consequence the fly nuisance persists in native villages. In towns, endeavours are made to enforce the use of dustbins or other receptacles, such refuse being collected twice daily. The Housing Problem does not press hardly on the country people, and in the smaller townships, housing conditions present few objectionable features. In the townships of Zanzibar itself, however, the position is more complicated, and of houses in the poorer quarters the Director of Medical Services observes,

they are made by their inhabitants into such squalid and filthy tenements that many of them must be regarded as unfit for human habitation. Steps are being taken for a sanitary survey of the town and the enforcement of such measures as may be necessary.

Animals and meat intended for human food are inspected by officers of the Veterinary Department or by Sanitary Inspectors. The enforcement of certain rules under the Public Health Decree of 1929 has resulted in more attention being paid to the condition under which food was handled, while since the beginning of 1934 all eating houses, bakeries, etc. are required to be licensed and before obtaining such a licence the Health Authority must be satisfied that premises and staff are suitable for the work.

Hospitals and Dispensaries, Clinics, etc.—536,242 (502,672) attendances for treatment at hospitals and dispensaries were recorded during the year. Of these 378,556 attendances were those of out-patients, 159,686 (157,167) were new cases and 4,463 (4,815) were in-patients, among the latter 446 (387) deaths occurred.

Records are not sufficiently complete or reliable to present a dependable picture of the incidence of disease throughout the Protectorate, but available records indicate that the most important diseases appeared to be the following—

Malaria—Total cases treated numbered 9,796 (7,536). 14 (14) deaths due to this cause occurred in hospital, and 751 cases of malaria

cachexia were seen. From the returns of the three Pathological Laboratories where blood smears were examined for the presence of malaria parasites the following items were noted —

		Zanzibar	Chake Chake	Wete
Total specimens examined	--	6,855	1,293	86
Percentage of total positive	--	33	31.9	46.5
Of positive smears, percentage containing:				
1 Benign tertian	--	54.0	32.2	33.3
2 Subtertian		13.9	15.0	35.6
3 Quartan	--	0.3	—	—
4 Undefined	--	31.8	47.5	31.1

On the other hand in another section of the Report the types of malaria (Zanzibar only) recorded by the Pathologist in the routine examination of blood smears sent to him and by the Malaria Research Officer in selected communities examined by him were stated to be —

	<i>P. falciparum</i>	<i>P. vivax</i>	<i>P. malariae</i>
Pathologist	79.3	20.3	0.4
Malaria Research Officer	62.5	28.8	8.7

When compared with the returns of the three laboratories the figures quoted immediately above show somewhat striking differences though no explanation of the discrepancies appears in the Report.

14 cases of *Blackwater fever* were diagnosed but detailed reports were received in respect of 11 only. 5 deaths were ascribed to this cause.

Tuberculosis.—The total number of cases of all forms of tuberculosis was 202 of which 191 were pulmonary. 50 deaths—all pulmonary—were recorded. Actually only 137 notifications of the disease were received, the discrepancy being due to the method of accounting for new cases at Government hospitals since many new cases are later admitted to the tuberculosis wards at Walezo and entered up as new cases there though most of them had been recorded as new cases at institutions where they were first seen. The betterment of slum property is receiving attention in Zanzibar and, with improved housing conditions it is hoped the incidence of the disease will decline.

Of other diseases of the respiratory system 12,529 (11,574) cases received treatment. Cases of acute and chronic *bronchitis* mostly reported from District Dispensaries totalled 10,097 (8,227) with 4 deaths. 229 (126) cases of *pneumonia* were seen 103 were admitted to hospital, where 28 died.

Under the heading of diseases of the digestive system 43,422 (41,321) cases were recorded with 56 deaths. Within this group 12,577 (12,488) patients received treatment for *ankylostomiasis* with 19 deaths. The disease is widespread and there is no evidence of its decline on the contrary there are reasons for believing that the true infection rate is

over 80 per cent among the general native population. People do not always seek relief for infestations with this parasite even when they are aware they harbour it furthermore there is little doubt that associated epigastric pains, dyspepsia, dropsey, chlorotic anaemia, etc. are frequently recorded by rural dispensers as separate entities instead of being regarded as manifestations of the disease, and in this way the real incidence of *ankylostomiasis* is masked. Of other helminthic diseases the reported incidence of *S. haematobium* was 874 (73) cases, the majority from Pemba where school children were found to be infected. Of ascariasis 597 (736) cases were reported during the year under review.

Diseases of the skin and cellular tissue formed the largest group, with 45,503 (50,564) cases of which 28,855 related to patients receiving treatment for ulcers. Some of the latter were of the so-called tropical type, but many were probably due to specific disease or scars of which 4,543 cases were recorded.

No serious epidemic of any sort occurred during the year of the more important infections and epidemic diseases encountered (excluding tuberculosis and yaws mentioned above) the following observations are submitted —

Of the 159,696 new cases of all forms of disease 19,833 (17,900) or 12.4 per cent. of the total related to epidemic endemic and infectious diseases within which group 90 (77) deaths occurred. Zanzibar has been free from plague in recent years rats are trapped regularly in the town and a percentage examined daily for infection with *P. pestis*, so far with negative results. Investigations are being undertaken with regard to the rat population of dhows with a view to the introduction of protective measures. No cases of smallpox occurred, the number of vaccinations carried out during the year totalled 10,283. *Dysentery*—a disease of dry weather in the Protectorate—and responsible for 68 (73) cases.

Cases of leprosy are said to have been reported from every dispensary and hospital. It is a little difficult to account for numerical discrepancies relating to the disease in different parts of the Report. In the

Return of Diseases and Deaths we are told 34 cases remained in hospital at the end of 1933 that 18 new cases were admitted during 1934 that 11 deaths occurred and that 29 remained in hospital at the end of the year on the basis of these figures we may presume 12 cases were discharged from hospital. At the Walezo Poor House, 34 lepers were in hospital on the 1st of January 1934 eight new cases were admitted 11 died and 2 were discharged, leaving a balance of 29 still in hospital at the end of the year. Then again at the Fund Island Leper Settlement it is stated 83 lepers were in the Asylum on the 1st of January 1934 15 new cases and 1 old case were admitted, 12 deaths occurred, and 6 were paroled during the year leaving a balance of 91 cases remaining at Fundi at the beginning of 1935.

In the *exotic group* 6 (5) cases of typhoid and 2 (1) of *paratyphoid* (all occurring in Zanzibar Town) were reported, with 3 deaths in addition 6 cases were notified by private practitioners, but their diagnoses were not confirmed by laboratory examination. A small epidemic outbreak of influenza during the earlier part of the year led to reports of 2,216 cases (no deaths) as compared with 984 in 1933.

446 new cases of syphilis were reported 56 receiving treatment as in-patients of the total cases recorded 23·1 per cent were primary 48·2 per cent. secondary 28·1 per cent tertiary and 0·2 per cent hereditary infections respectively. The general conclusion following the examination of a number of school children suggests that 5-10 per cent. of examinees suffered from congenital syphilis this investigation is to be continued. 1,698 new cases of gonorrhoea received treatment. The figures for syphilis and gonorrhoea are said not to reflect the true incidence of these diseases the Report on Prisons and Asylums observes of syphilis among prisoners blood samples taken for the Kahn test resulted in 38 per cent. being positive, and of gonorrhoea, "many of the adult male prisoners were suffering from acute or chronic gonorrhoea, or gave a history of having contracted the disease in the past."

Laboratory Reports—Routine work at the Zanzibar Laboratory was unusually heavy during the year leaving little opportunity for work of a special nature or for research. 13,897 examinations were undertaken, an increase of over 40 per cent. over the total for 1933. Mention of blood smears examined for malaria parasites has already been made. Of 2,050 specimens of faeces examined, 1,074 contained hookworm ova, 66 ascaris and 3 schistosomes (*2 S. mansoni*, *1 S. haematobium*). Commencing in March, the Kahn test replaced the Wassermann reaction test, and of 724 sera received, 31 per cent. were positive. Dysentery bacilli were isolated in 27 cases viz. *B. dysenteriae* Flexner 22 *B. dysenteriae* Shiga 2 and *B. dysenteriae* Sonne 3.

At the Chake Chake Laboratory a total of 4,557 examinations for the year is recorded. Of 1,434 faeces examined, 522 contained hookworm ova, 67 *S. haematobium* 66 ascaris. The annual return of the Wete Laboratory reports a total of 249 examinations comprising 86 bloods 72 urines, 22 smears for *M. leprae* 18 sputa, 51 faeces of the latter 28 contained hookworm ova.

Prisons and Asylums—No serious illnesses nor outbreaks of epidemic or infectious disease were reported from any of the six Protectorate Prisons. A detailed medical examination of prisoners revealed diseased conditions significant of vitamin deficiency partly due to unsuitable prison diets. A new ration scale adequate in vitamin content and caloric value is being prepared.

Scientific—The following papers by members of the Medical Staff were published during the year —

- WEBB W. Leslie The Sub-Dispensary System in Uganda.—*Trop. Dis. Bull.* 1934 Vol. 31 No. 6
VASSALLO S. M. Urinary Fistula in the Female.—*E. African Med. J.* 1934 Vol. 11 No. 6

Financial—Total expenditure amounted to £47,388. What proportion of the total revenue of the Protectorate this sum represents is not stated.

SOMALILAND PROTECTORATE (1934)

Somaliland occupies the North-eastern horn of the African continent, jutting into the Indian Ocean on the north of the Gulf of Aden. The boundaries have been settled by agreements with France, Italy and Abyssinia. The chief ports are Berbera, Bulhar and Zeilah, and its area about 68 000 sq. miles, or one-sixth larger than England and Wales together.

General—There was considerably more sickness throughout the Protectorate during 1934 some of the infectious and insect-borne diseases showing increases over the 1933 experience. There was, however, less destitution and no further measures other than those concerned with the camps opened in 1933 (see this Bulletin 1935 Supp. p. 70*) had to be undertaken by Government.

Vital Statistics—The estimated native population figure remains unchanged from that for 1933 viz. 344 700. No data relating to births, deaths or infant mortality are available for the Protectorate as a whole but mortality figures for seven townships are supplied, namely Berbera 118 (63), Borama 28 (21), Burao 27 (39), Engave 33 (11), Hargeisa 119 (100), Sheikh 18 (28) and Zeilah 73 (31).

European Officials numbered 113 (119) with an average number resident of 50 (60). One (2) was invalided and no deaths were recorded. **Asiatic Officials** numbered 72 (68) the average number resident being 56 (60). Two (1) were invalided no deaths recorded. Of Troops total strength is returned as 581 (586) with average strength 420 (409). Six (6) were invalided—four unfit for re-engagement, one chronic arthritis and one mental case. There were 9 (4) deaths six due to pneumonia (undefined) one broncho-pneumonia, one lobar-pneumonia and one relapsing fever. The total strength of the Police was 607 (607) with an average strength of 580 (580). Three (5) were invalided, on grounds of cataract of left eye debility and pulmonary tuberculosis respectively and 9 (6) deaths were recorded, causes of death being pneumonia 2, lobar pneumonia 3 influenza, cerebral malaria, cellulitis and rabies, each one death.

There is no *maternity and child welfare work* other than that among during the course of hospital practice.

Public Health Sanitation etc—There is nothing new to report with respect of general *Hygiene and Sanitation*. With regard to Food the milk-supply in Berbera is uncertain both as regards quality and quantity. Samples of contractor's *ghee* were found to be adulterated to the extent of "approximately 40 per cent." with a vegetable oil. Steps have been taken to ensure that future supplies shall not contain more than 15 per cent of the adulterant.

Hospitals Dispensaries Clinical Returns etc—In-patients admitted to the seven established hospitals (see this Bulletin 1935 Supp. p. 71*) totalled 3,255 (2,430) and out patients 49,034 (41,563). The increase in the numbers of both in and out patients was common to all hospitals, the percentage increase being highest for Sheikh and Borama with respect to in-patients, and for Borama and Hargeisa as regards out patients. Smallpox, chicken pox, measles, malaria and relapsing fever showed a much higher incidence during 1934.

Malaria—Better rains such as fell during the year invariably mean an increase in malaria cases. 787 cases were recorded, as compared with 282 during the preceding year. In the hospital returns it is noted

573 (162) in patient cases and 787 (262) out patient cases were treated. Among in-patients *P. falciparum* was the infecting parasite in 66 per cent. of cases *P. vivax* in 25·6 per cent. and *P. malariae* in 8 per cent. the corresponding percentages among out patients being 65·27 and 8 respectively. Only nine hospital deaths were recorded but it is believed the deaths due to malaria in the interior must have been considerable.

No case of *exanthem* or *undulant fever* was reported but hospital returns quote 160 (96) cases of *dysentery* 152 being unspecified, 3 amoebic and 5 bacillary 38 cases were treated as in patients. The disease is little more than a mild diarrhoea and readily yields to treatment.

Other infective diseases included *smallpox* 91 (33) cases with 2 (4) deaths most of the cases seen at hospitals near the Abyssinian frontier 81 being treated at Hargeisa. Vaccinations totalled 18,095 (13,277). *Measles* and *chickenpox* were much more prevalent 94 (15) cases of the former and 204 (96) of the latter being recorded, while cases of *influenza* numbered 348 (262). There was one fatal case of *cerebrospinal meningitis*.

The record numbers of cases of *relapsing fever* mentioned in the 1933 Report was exceeded in 1934 when 545 (496) in-patients and 834 (704) out-patients were treated. Burao again heads the list with 530 (512) cases then comes Hargeisa with 171 (88) Borama with 76 (38) and Berbera with 59. The tick proofing of the walls and floors of mosques in Burao (the chief endemic centre) was carried out during the year and it is thought a lessened incidence of the disease is observable. It is hoped that native coffee-shop keepers may be persuaded to adopt similar measures of protection.

Leishmaniasis is rare, no cases having been diagnosed since 1927. In August, 1934 Leishman Donovan bodies were found by liver puncture in the case of a European official. Sandflies exist but have been considered harmless in view of this occurrence a sharp look-out is to be made for other cases. Another new disease for Somaliland made its appearance in the shape of an outbreak of *rabies* in Borama two fatal in-patient cases are recorded in the hospital returns two other fatal cases are mentioned in the text of the Report, and two cases were treated as out patients. The outbreak is discussed elsewhere in this Bulletin.

In-patient cases treated for *tuberculosis* (all forms) numbered 70 (55) out patients were 403 (368) and there were 5 (8) deaths due to this cause. The pulmonary form of the disease was responsible for 10 (10) in-patient and 199 (200) out-patient cases with 2 (1) deaths but these figures are said to be no indication of the real incidence of the disease as only very sick persons seek treatment. A camp for infectious pulmonary cases has been established at Berbera, but difficulty is experienced in persuading sufferers to remain.

With regard to *leprosy* admissions to the leper Camp Berbera, during the year numbered 10 (6) making the total of 32. Of these 2 (4) were discharged as cured, 5 (2) as unimproved and one (1) died, leaving at the end of the year 24 fumates at the Camp. It is considered that the surroundings and climatic conditions of Hargeisa would be better suited to the needs of a Leper Settlement.

Veneral Diseases.—Cases of *syphilis* declined from 340 in 1933 to 220 in 1934 and gonorrhoea from 236 to 189.

Scientific.—The Laboratory Report records the examination of 5,869 (5,630) specimens during the year and of the total 4,441 (3,904) were blood films and 564 (576) sputa. Three short reports on interesting cases are appended (a) a case of bilateral congenital deformities of the upper limbs in a Somali male aged 30 (b) a case of Guinea worm, the patient a Somah male aged 28 (cases of the infection are not usually met with in British Somaliland) and (c) a case of suspected acute Anti-Pollomyelitis, the patient a girl of 2 years, the daughter of a European Official at Berbera.

Financial.—Total expenditure on the Medical Department amounted to £9,928 (£9,379), a sum which represents 9.3 (8.4) per cent. of the total revenue or 5.9 (6.1) per cent. of the total expenditure of the Protectorate.

RHODESIA

NORTHERN RHODESIA (1934)

Northern Rhodesia lies north of the Zambezi River with Tanganyika Territory and the Belgian Congo to the north Nyasaland and Portuguese East Africa on the east Southern Rhodesia and South west Africa on the south and Portuguese West Africa on the west. The area of the Territory is estimated at about 287,950 sq miles and divided for administrative purposes into nine Provinces.

Introduction—As a result of economy measures no appointments to posts vacated in 1933 were filled during the year. The general economic position of the Territory improved greatly by the end of 1934 and it is hoped that development as envisaged prior to the economic depression will shortly commence.

Vital Statistics—According to estimated figures the native population again shows a slight decrease 1,968,425 as compared with 1,371,213 in 1933. There is no system of vital registration among the natives and therefore the population estimates must be regarded as conjectural. For 411 villages with a total population of 42,763 the following vital facts were recorded—

Births 2,413 birth rate 56.4 per 1,000 Infant deaths 419 infant mortality rate 178 per 1,000 births.

The estimated European population was 11,464 (11,278). Births registered 315 (318) birth rate 27.5 (28.2) Deaths 108 (103) death rate 8.4 (9.1) Infant deaths 15 (13) infant mortality rate 47.6 (40.9) per 1,000 births. Blackwater fever was again responsible for the greatest number of deaths among Europeans viz 12 (20).

European Officials numbered 540 (650) with an average number resident of 452 (525). One (2) was invalidated on grounds of chronic asthma no (1) deaths were recorded.

The returns relating to Native Officials were found to be incomplete and were therefore omitted very little illness among the African staff was reported.

Maternity and Child Welfare—Encouraging reports were received from the Clinics established at Livingstone Lusaka Ndola and Luanshya. At the Livingstone Centre European and Native Welfare Clinics are held twice weekly at the European Clinic 44 (59) cases and 444 attendances were recorded, and at the Native Clinic 173 (114) cases and 1,127 attendances. In addition 866 (341) native patients attended on 12,540 (3,290) occasions for treatment at the Maramba Dispensary.

The Lady Medical Officer in charge of the Lusaka Centre reports the steadily increasing popularity of the clinic among native women who begin to appreciate the value of ante-natal treatment. 127 European children or 75 per cent. of all European children under two years of age attended for treatment, and also there were 6,499 (588 three months only) native cases with 26,090 (2,215) attendances.

The new Child Welfare Clinic (European) at Ndola donated by the Beit Trustees was opened in May 1934. Thenceforward 139 children, of whom 93 were under one year were treated, 5,335 attendances were recorded, and 644 home visits were made. Milk and quinine were issued daily to children during school term an average of 20 children attended daily for this purpose and 2,700 pints of milk were issued.

At the Ndola Native Clinic results were unusually gratifying—873 (706 women and 2,295 (1,978) children received treatment, and 18,570 (15,026) attendances were recorded.

School Hygiene—It was not possible to carry out the two usual medical inspections of all schools, but all were examined once, and those in the Lusaka District twice. In the latter area, nutrition and cleanliness were not altogether satisfactory and a large proportion of the children showed enlarged spleens. Malaria parasite rates were determined (results not stated). Nutrition of school children in the Copper Belt was found to be good. 28 per cent. suffered from tonsillar enlargement and 10 per cent. enlarged spleens. At Livingstone, general health and physique were below the desirable standard. The boarders at Choma and Mazabuka and scholars in the Lusaka District, were on the whole healthier than day scholars perhaps due to such factors as regular and balanced diets, disciplinary control of general living conditions etc.

Bi-yearly dental inspections of all Government Schools were made. In the Copper Belt, 45 per cent. of the children suffered from dental caries. In the Lusaka District dental condition on the whole was good.

As soon as arrangements can be made, one Medical Officer will be appointed to inspect all Schools and draft a comparative report.

Public Health Sanitation etc—The general health of both Europeans and Natives was satisfactory and apart from a severe outbreak of measles in the Barotse Province, no epidemics were recorded. Increased employment has reacted with beneficial results throughout the country. The native interest in medicine and the treatment of disease is steadily increasing.

Methods of sewage disposal remain as previously described (see this Bulletin 1935 Supp. p. 74*) and continue to function satisfactorily. With regard to water supplies, that of Livingstone pumped from the Zambezi River is filtered and chlorinated before it reaches the main, and is excellent. A new chlorinating and softening plant is to be installed for use in connection with the water supply to Lusaka, the new capital. In the old township shallow wells still exist, and the extension of piped supplies is a matter of some urgency. In the Broken Hill area the piped supply provided by the Rhodesian Broken Hill Development Company has been analysed from time to time with very satisfactory results. Reports relating to Ndola supplies are equally satisfactory.

Labour conditions were infinitely better than during 1933—the number of natives employed in various industrial undertakings showed an increase of 20,584 over the figures for the preceding year. No recruiting was necessary, all the labour required being available without special measures.

Housing—Extensive building operations at the site of the new capital commenced during the year and Government House together with many houses and offices of new design were erected for the accommodation of European Government Officials. All these buildings are provided with water-borne sewage systems and septic tanks. The housing of non-Government European personnel in the employment of mining interests leaves little to be desired.

No great progress is noted with respect to native housing in rural areas though in areas in close proximity to European settlements

great improvements have been effected. Native employees of the various industrial and commercial organizations are well housed. Copies of Dr DE BOER's Report (see this *Bulletin* 1935 Supp p 73*) have been issued to District Officers and Missionaries and a section of it under the title of "*A talk with African Chiefs*" has been translated into African dialects and distributed among Chiefs and Headmen and is also to be used in all native schools.

Routine inspections of hotels trade premises dairies markets etc. were made in various centres throughout the year.

Port Health Work—The only port in the Territory is at Mplungu on Lake Tanganyika. Under existing arrangements the Medical Officer at Kasama makes monthly visits for the purpose of inspecting the one ship which at present plies between Kigoma in Tanganyika and Mplungu. The Postal Official, who also acts as Customs Officer submitted such reports as were necessary on occasions when the Medical Officer was unable to attend.

Hospitals Dispensaries Clinical Returns etc—Government continued to maintain 7 (7) European and 11 (11) Native hospitals in the Territory during the year certain additions to existing establishments were erected. There are now 14 (13) rural dispensaries in charge of native trained orderlies in addition to dispensaries on Government stations (see this *Bulletin* 1935 Supp p 74*) Mining interests continued to maintain their well-equipped European and Native hospitals.

Mission Societies continue to do valuable work at the 27 Mission hospitals established in outlying districts and the medical subsidies contributed by Government towards their undertakings is money well spent.

In-patients treated at the 7 European hospitals numbered 1 484 (1,349) with 25 (30) deaths and at the 11 Native hospitals 9 078 (8,376) with 398 (325) deaths case fatality rates per cent were Europeans 1·69 (2·22) Natives 4·38 (3·70). Native out-patient attendances at 10 hospital centres totalled 148 154 and at rural dispensaries 33 433 out-patients received treatment. European inpatients at 10 Mission hospitals numbered 102 and of natives at 23 such hospitals 6,904 out-patients were Europeans at 14 hospitals 323 and Natives at 22 hospitals 77 199 (Figures are not provided for all the 27 Mission hospitals.)

Malaria—Admissions to Government European Hospitals numbered 413 (345) and 2 (0) hospital deaths were recorded, though 10 (3) malaria deaths occurred among Europeans in the Territory as a whole. To Native hospitals 844 (826) cases were admitted 22 (12) proving fatal. All hospital cases are defined as subtertian infections. *Black water fever* was again responsible for the greatest number of deaths among Europeans 12 (20) deaths being ascribed to this cause eleven of these deaths occurred in the densely populated Luangwa Province in which the mining area is situated. Extensive anti-malarial measures continue to be carried out in all areas. In spite of a considerable increase in the population of Lusaka consequent upon the extensive building operations in connection with the new capital malaria admissions to the European hospital were the lowest on record with 60 (120) cases in this area *A. gambiae* and *A. funestus* were the common anophelines found. The Medical Officer Ndola reports a conspicuous

absence of malaria mindedness amongst the European community in the District. The following data are taken from records maintained by industrial interests —

	Natives employed	Malaria		Blackwater Fever	
		Cases	Deaths	Cases	Deaths
Broken Hill Development Co	1,548	102	1	—	—
Nkana Mine	6,912	28	—	1	1
Mufwira Mine	2,134	140	—	—	—
Roan Antelope Mines	4,763	42	—	—	—

Notified cases of *enteric fever* were Europeans 20 (8) and Natives 43 (11). In another section of the Report it is stated that native cases notified numbered 37. Increases were especially noted in the mining area. According to the Hospital Returns 21 (8) cases were treated in European hospitals (10 typhoid 11 paratyphoid A) with one death, and 14 (32) in Native hospitals (all typhoid cases) also with one death. There was an increase in the number of cases of dysentery 182 (16) cases of bacillary and 34 (85) cases of amoebic dysentery being reported of these only 2 (6) bacillary and 8 (34) amoebic occurred among Europeans. Of the total bacillary cases no less than 181 occurred among natives in the Fort Jameson area. On the other hand, from Lusaka formerly the chief centre of the dysentery group only 5 cases of the amoebic type of the disease were reported. Hospital in-patients were Europeans 18 (34) of which 14 (22) were amoebic and 4 (6) bacillary natives 84 (81) of which 34 (25) were amoebic and 50 (52) bacillary.

Four (3) European and 127 (64) native cases of *relapsing fever* were reported during the year. The disease is endemic in the Plateau area, the vector *O. moubata* being practically non-existent in the valleys. In the Fort Jameson district alone (still the main focus of the disease) there were 90 cases (1 European 89 natives). Though the infection has not previously been reported from the Mongu area, during 1934 there were 28 native cases due it is believed to introduced infection from the North-East. The Medical Officer in the Mongu area believes many cases of relapsing fever must be missed, for blood slides taken of 50 consecutive patients complaining of headache, body pains, high temperatures, 24 per cent. contained *Spirocheta recurrens*.

There were two small outbreaks of *smallpox* of a mild type only 16 native cases none of which was fatal, being reported. The extensive vaccination campaign during recent years has had the desired results. Of varicella 22 (54) European and 157 (318) native cases were notified, only 8 cases were reported from mining districts as against 215 in the previous year. *Measles* on the other hand was responsible for 36 European and 861 (47) native cases. In the Kalabo district there were 674 cases with 620 deaths among children under 1 year. 101 (47) native cases were reported from Balovale and 86 of which 3 were fatal from Fort Rosebery. There was a further reduction in the number of notified cases of *cerebrospinal meningitis* 7 as compared with 11 in 1933.

Cases of *influenza* reported during the year were Europeans 689 natives 2,136 (on page 6 of the Report European notifications are

returned as 165 and of natives as 979). There were 58 deaths of natives ascribed to this cause. 62 cases of *tuberculosis* of the pulmonary type were reported (Hospital Returns record 58). Of the total cases 15 were from the mining district and the remainder from other stations suggesting that the disease is not confined to industrial centres but occurs also in the rural areas.

Sleeping sickness of which 13 (11) cases were reported during the year is practically confined to the Luangwa Valley and to a smaller area in the Ndola District around the Lower Luwishi River. An investigation into the incidence of fly in the Ndola District is desirable and perhaps also along the Luangwa Valley. No European cases were reported.

Leprosy notifications are stated to have numbered 169 (184) though in the Hospital Returns 194 natives received treatment for the disease as in-patients. The Report adds it is impossible to state with any degree of accuracy the number of lepers in the Territory but they must amount to several thousands. Balovale District with 82 cases is still the most heavily infected area. It is noted from the returns relating to Medical Missions that 198 lepers were treated at 13 Mission hospitals.

Veneral diseases are widespread among the natives of the Territory and especially prevalent in the Barotse Province. Total cases recorded were, *syphilis* 5 618 (4 968) and *gonorrhoea* 382 (376). Special clinics for the treatment of these diseases do not exist except at Mongu where treated cases increased from 1 812 in 1933 to 2 867 in 1934. In all areas V.D. treatment is an important part of the daily routine in every hospital. Fresh infection is continually being introduced from Angola into Balovale where cases increased from 751 in 1933 to 1 167 in 1934.

Helmintiasis.—*Ankylostomiasis* is common in all districts but in the opinion of most Medical Officers is of little economic importance. Among 1 193 admissions to the Livingstone Native Hospital, stool examinations showed ova of *Necator americanus* in 40 per cent of cases. *Schistosomiasis* is also relatively common for the control of the disease an experiment is being made with *Tephrosia vogelii* a plant cultivated by the natives and used as a fish poison. Precise data relating to these diseases are not available but the following items are taken from Government Hospital returns. *Ankylostomiasis* Europeans 2 Natives 110 *Schistosomiasis* Europeans 3 Natives 121.

With regard to other diseases mentioned in the Report 13 outbreaks of *rabies* were reported in the Mazabuka Veterinary district. Two cases admitted to the Mongu Native Hospital died within 48 hours the Medical Officer in this area says rabies is very prevalent and human deaths must be far from infrequent. There were 42 European and 170 cases of *whooping cough* 158 cases being reported from Fort Jameson district no deaths were recorded. Nine cases of *anthrax* were treated in native hospitals 7 of these two of which were fatal occurring in the Mongu area. Dr F W GILBERT Medical Officer Mongu, treated these cases by intravenous N.A.B injections, and reported five recoveries in this connexion see *Human Anthrax in Barotse-land treated with Norazrenobenzene* by F W GILBERT *The Lancet* 1933 Dec. 7 Vol. II No. 23.

Scientific.—There is no Government Laboratory in the Territory a situation that can scarcely be regarded as satisfactory specimens

At the hospitals 58 (56) cases of tuberculosis (all forms) received treatment of these 25 (22) were pulmonary with 12 deaths. Dispensary returns record 445 (517) cases were treated, 254 (318) of these being pulmonary. No cases of whooping cough appear in the hospital returns, though at the Dispensaries 312 (311) out patients received treatment for this cause. Dysentery was responsible for 73 (84) out-patient cases and 14 hospital cases, 4 were returned as amoebic, 55 bacillary, and 14 undefined, and among the hospital group 1 amoebic and 13 undefined. 78 (3) pellagra cases received dispensary treatment, and 11 patients were admitted to hospital for this disease.

Venereal Diseases claim much the same percentage of total cases of all forms of disease treated at the dispensaries as last year 5,816 (5,732) cases were recorded, of which 4,908 (5,137) were syphilitic patients 823 (569) gonococcal infections and 37 (26) chancreous cases. With regard to the 333 (490) cases of lymphadenitis, lata (non specific) which appear in the Dispensary Returns although this title finds a place among the Diseases of the Circulatory System in the Detailed International List of Causes of Death (1929 revision), the term is undesirable unless steps have been taken to ensure that these cases are definitely non-venereal (see also this Bulletin 1933, Supp. p 78*).

Leprosy—The Report of the Medical Officer Dr Germoxo contains a detailed and useful account of the movement of the leper Settlement population during a great part of the 21 years of its existence. 102 (138) admissions were recorded during the year 31 (33) were re-admitted, 82 (76) died, 35 (47) were discharged and 15 (26) deserted. the leper population on 31st December 1934 numbering 729 persons—347 males, 382 females thus for the first time in ten years there has been a small decrease in the Settlement population. As regards the duration of the disease before admission of the 102 patients admitted during 1934 50 per cent. had had symptoms for one year or less, 37 per cent for one to two years and over and 12.7 per cent. for a period unknown. There are 94 (82) leper children in the Settlement aged 16 years and under and of these 17 were admitted during the year under review. Of non-leprosy children there are 21 as against 27 in 1933.

Methods of treatment have been previously discussed (this Bulletin 1934 Supp. p 73* and 1935 Supp. p. 79*) The intradermal injection quickly causes the visible skin lesions to disappear but, on the other hand in the truly cutaneous cases—*i.e.* nodular—Dr Germoxo has abandoned this treatment finding that it aggravates the disease. His policy is now to discharge early neural patients after all visible and bacteriological signs of the disease have disappeared even should this occur in less than a year after admission of the patient only two of his own patients have returned with a recurrence of the lesions. The policy seems to be sound in view of the fact that most authorities regard cases of pure neural leprosy as non infective. Except for experimental treatment with intravenous injection of aniline dyes—of the value of which it is still too early to express any opinion—no other treatment than that of intradermal injection of iodized esters has been offered to patients. Excellent results seem to have followed the adoption of the inspectional system of 1929. In all the districts of Basutoland, except the Eastern one of

Qachas Nek the situation is satisfactory very few certified lepers remain at large for an unreasonable length of time there has been a steady improvement in the character of cases and the numbers admitted have declined each year throughout the period 1929-34.

The Report of the Superintendent of the Leper Settlement Farm supplies an interesting summary of activities and details of the products of the farm during 1934.

Financial—Total expenditure amounted to £45 774 (£44,230). What proportion this sum bears to the total revenue of Basutoland is not stated. Of the total sum expended Medical Charges totalled £24 488 (£23 132) Leper Settlement £19 509 (£19,388) and Sanitation £1 775 (£1 710).

BECHUANALAND PROTECTORATE (1934)

Bechuanaland is bounded on the south and east by the Union of South Africa, on the north by Southern Rhodesia, and on the west by South-West Africa. It has an area of about 275 000 sq miles. The High Commissioner for South Africa supervises the affairs of the Protectorate.

Introduction—Difficult conditions were again experienced in the Protectorate. The drought of 1933 (see this *Bulletin* 1935 Supp p. 79*) gave place to a rainfall above the average and record crops were anticipated yet a serious invasion of locusts dispelled these hopes, and large sections of the population in various areas were once again reduced to semi-starvation. Still further a renewed outbreak of Foot and Mouth Disease in April continued the total prohibition of the exports of animals and agricultural produce thus accentuating the economic situation and compelling Government once again to take steps to alleviate poverty and starvation in certain districts of the country.

Vital Statistics—That detailed information is not available is attributed to lack of staff. The data contained in the Report are therefore meagre. No census has been taken since 1921 (when the total native population was returned as 151,200) and no records of births and deaths are maintained. The following estimates appear in the Report—

European population—1 749 births 40 birthrate 22.8 per 1 000 deaths 25 death rate 14.3 per 1 000

Native population—200 000 (In another place the figures appear to be 202,200)

Recent legislation defining the duties of native chiefs will in course of time make it possible to obtain from them vital records for the areas within their respective boundaries.

Maternity and Child Welfare—The work conducted by the Welfare European Nurse at Serowe continues to grow and develop. During the year 508 huts were visited to give assistance in midwifery sick nursing, etc. 202 women were given attention at some period of their pregnancy and 79 of these were attended at their confinements. The following details are given Male births 56 female births 37 miscarriages 12 stillbirths 3 not yet born 78 not traced 16 total 202. There was one maternal death. An ante-natal clinic was

opened in August and during the ensuing five months 106 women attended regularly for examination and advice. Having regard to the ignorance superstitious beliefs, and other circumstances combining to hamper the progress of this work results are unusually gratifying. Work of a similar nature has been commenced at Ramousia village by a European trained nurse of the German Lutheran Mission.

School Hygiene — Pressure of other duties prevents medical officers from continuing the systematic medical inspections introduced two or three years ago but on occasions when tribal schools are visited and inspected it is found that the children are cleaner and better cared for than formerly. This improvement is attributed to the effect of propaganda measures and to lectures in hygiene and sanitation given by medical officers to teachers and at the training camps for native Boy Scouts and Girl Guides.

Public Health Sanitation etc — In view of developments in the Territory a legislative measure was enacted unifying all previous enactments and making better provision for the control of Medical and Dental Practitioners, Nurses, Midwives and Pharmacists. In order not to interfere unduly with native customs, the position of native Herbalists practising as such according to native usage, was legalized they are debarred by law from dealing in sorcery or witchcraft which unfortunately plays an important role in the methods of native doctors."

The Protectorate Sanitary Regulations under the Public Health Proclamation unify all previous separate enactments and make possible the introduction of improvements in sanitation and public health. Most of the Territory is Native Reserve and for the present these Regulations will be applied only to defined areas where Europeans are in close settlements such as the more important railway centres. For financial reasons no new sanitary developments have been possible in the Native Reserves.

Sewage disposal arrangements at Lobatse and Mahalapye have been greatly improved. It is now legally possible to inspect butcheries, to demand fly-proofing, to insist on standards of cleanliness, etc. At Francistown a small abattoir is in course of erection to replace existing insanitary arrangements for the slaughter of cattle.

Labour — The Health and Sanitation (Mines and Works) Proclamation has special application to mining camps, etc. where most of the labour is native and insists upon the proper care of such labourers in regard to housing diets, wash-houses, medical attention and so on.

Hospitals Dispensaries Clinical Returns etc — Medical Officers at their stations are single-handed and are responsible for hospital administration treatment, surgical operations, and for station and outlying dispensary work considerable augmentation of staff in the Northern Protectorate is desirable.

A Government hospital and nurses home are in course of erection at Francistown, and an X-ray apparatus donated by the Earl of Athlone and H.R.H. Princess Alice, has been added to the Lobatse Hospital.

Good work is being done at the Medical Missions Hospitals and Dispensaries and the co-operation of Mission officials with administrators is most cordial and helpful. The newly erected hospital of the United Free Church of Scotland Mission is a valuable addition to the medical

work of the Territory. Government funds have been authorized to assist missions in establishing hospitals in Ngamiland and in the Tswapong area of the Ngwato Reserve. There is urgent need for the establishment of hospitals at Bobirwa and Bokalaka, and for properly equipped travelling dispensary units in order that remote and sparsely populated areas might be reached.

In-patients treated in Government and in Mission hospitals totalled 1 198 (839) and out patient attendances at dispensaries and out stations 55,500 (41,220) of which 28 759 (22,815) were first attendances. Separate statements for Government institutions and mission hospitals are not given and it is noted that the figures in hospitals returns relating to in-patients and out patients respectively are not in agreement with the data presented in the text of the Report.

Malaria.—The good rains proved a mixed blessing in that the Western areas of the Territory experienced one of the worst malaria epidemics on record. In the Ghanzi district practically 100 per cent. of the population European and native were affected. Necessary steps for dealing with the epidemic were taken but a week after notification of the Ghanzi outbreak information was received of an epidemic of greater severity in the sparsely inhabited Southern and South-Western Kalahari. As no Government Medical Officer was available, an experienced European dispenser was despatched to the affected area equipped with adequate supplies of quinine. Lack of proper food had so lowered the resistance and vitality of the people that in addition to treating the disease Government had to make emergency arrangements for supplying food to both European settlers and to natives a task of unusual difficulty by reason of inadequate and inconvenient road and rail communications. An aeroplane was requisitioned and used for the more rapid distribution of remedies and energetic measures of attack led to the complete control of the epidemic within a few weeks. Accurate statistics are not available but in the areas affected among an estimated population of 7 340 some 5,540 cases of malaria were recorded with 232 deaths. Microscopic examination of blood specimens was practically impossible but the few slides taken and examined by the Medical Officer in charge of operations showed mainly benign tertian infections. In the Hospital Returns among 45 in-patient cases benign tertian and subtertian infections numbered 42 and 3 respectively and among 8 153 out-patient cases 6 130 were returned as benign tertian 22 as subtertian and one as blackwater fever.

Dr DVKE concludes his Report upon the epidemic by contributing an interesting commentary upon the living habits of the natives the difficulties of malaria control measures in the Territory and the widespread neglect of quinine prophylaxis by natives and Europeans alike. He points out that a variety of local circumstances and conditions combine to make malaria control by anti-larval or other mechanical methods impossible, and that quinine is the only practicable prophylactic for the majority of the population.

Tuberculosis.—According to Hospital Returns 342 (348) cases of tuberculosis were treated and of these 216 (233) were pulmonary. In the Lobatsi district "a fractional part of the country whose climate approximates the optimum in anti tubercular properties and in a race which lives very much in the open air" 90 cases were diagnosed,

and of these 56 were pulmonary. The majority of the latter were out patient cases, many having travelled long distances seeking admission to hospital. Lack of accommodation made this impossible, and the sufferers would remain reservoirs of infection for the communities in which they live. The disease seems to be spreading in the Protectorate and some means of segregating phthisical patients appear desirable.

Outbreaks in mild epidemic forms of influenza chicken-pox and whooping cough were reported. Cases treated were as follows—

Influenza 396 chicken-pox 105 whooping cough 103. Diphtheria was responsible for 123 cases with 2 deaths of the total cases recorded 59 were amoebic, one bacillary and 63 undefined.

Tuberculosis are widespread, especially among the large proportion of people living at great distances from medical centres, and beyond the reach of medical treatment. In-patients treated for syphilis numbered 69 (55) and new cases among out-patients 7163 (9 143) the total number of out patients under treatment being 28 194 (22,815). A noticeable reduction in the number of new infections is reported, and it is believed that given facilities for making treatment available in remote areas the disease could and would be brought under control. With regard to gonorrhoea though the number of cases was fewer—392, as compared with 423—Medical Officers are of the opinion that only a fraction of those infected seek treatment, and that the disease is becoming more widespread. New cases of venere numbered 85 (84). Arsenical and bismuth preparations were used more liberally than in previous years.

Seven (7) cases of leprosy were treated six were old-standing cases and one a new case. It is estimated the total number of lepers in the Territory does not exceed 40 but only a proper survey could determine the position with precision. No provision is yet made for the segregation of lepers, but living as they do in isolated posts, the opportunities for extension of the disease outside family limits are believed to be small.

Urinary schistosomiasis seems to be the only helminthic disease of any consequence, and even that appears to have a purely local incidence. Of the 101 (101) cases treated during the year 98 were from the Bakgatla Reserves and the remaining three probably infected in the same area. The remainder of the Territory is presumed to be free of infection.

Anti-scorbutics—Cases of scurvy numbered 114 (206) and of pelagra 17 (1). The figures must not be regarded as precise numerical expression of the total incidence of vitamin deficiency in the diets of a very large proportion of the population, but only as an approximate reflection of the general nutrition characterizing a particular year. The better nourishment of 1934 as a result of good rains making supplies of green foodstuffs moderately plentiful was shown by the almost complete absence of cases due toavitaminosis B that were so prominent a feature in the 1933 experience.

Other Diseases—Rumours have long been current among the natives in Ngamiland that people inhabiting certain areas in the tsetse-fly belt contracted a disease which always terminated fatally and which was termed *Egotseka*, or "Go Otseka," meaning 'light inter mittent shiver'. In 1909 1910 and again in 1930 these rumours

were the subject of field investigation but results proved inconclusive. In November 1934 the Administrative Officer in the Chobe District reported the serious illness of two native constables and the Medical Officer at Maun (240 miles away) was sent to investigate. One of the blood slides taken to Maun for microscopic examination showed in addition to malaria parasites two trypanosomes. The surviving case was submitted to the Livingstone General Hospital (Northern Rhodesia Administration) where gland punctures proved conclusively an acute trypanosome infection. Treatment was successful and the patient discharged cured some weeks later. The Administration are taking active steps to deal with the infective areas. More accurate information is however desirable regarding the distribution of sleeping sickness in the fly belt and the services of an experienced entomologist are considered necessary for the purpose.

Other communicable diseases which cause apprehension are typhus and plague. Typhus made its appearance among a section of the Baraong Tribe (Cape Province) within a few miles of the Protectorate border—the tribe is in continual communication with friends and relatives in the Protectorate. No cases have occurred in the Territory but vigilance is being maintained. Cases of human plague were also reported within 50 miles of the Territory wherein field rodents of all kinds have increased alarmingly during recent years. Necessary measures have been taken to guard against the possibility of introduced infection and all sections of the population urged to destroy rodents found within their areas.

Financial—For the year ended 31st March 1935 (not for the calendar year) expenditure totalled £14,215 (£12,897) a sum which represents 10 (8 1) per cent. of the total expenditure of the Protectorate.

SWAZILAND (1934)

The Swaziland Protectorate is situated in British South Africa between the Drakensburg and Lebombo Mountains and is bounded on the north west and south by the Transvaal and on the east by Portuguese East Africa and Zululand. Its total area is 6 705 sq. miles.

Vital Statistics—The estimates of population for natives, Eurasians and Indians were 125,920 (122 000), 770 (680) and 10 (10) respectively. Registration is not compulsory and no data relating to births and deaths are available.

The general European population was estimated at 2,833 (2 750). European births numbered 78 (46) and deaths 20 (28) the resulting birth and death rates being 27 5 (16 7) and 7 1 (10 2) respectively.

European Officials numbered 97 (95) with an average number present of 95 (93). No invalidings or deaths (1) were recorded.

Native Officials numbered 145 (148) with an average number resident of 140 (142). Here again no case of invaliding or death was recorded.

Maternity and Child Welfare Work—The Raleigh Fitkin Memorial Hospital, Bremersdorp is the only centre having a clinic with staff devoted entirely to this field of work. Elsewhere at Government

hospitals, dispensaries, etc. It can only be done as part of the usual daily work. The steadily increasing number of native women attending for ante-natal examination and advice, and entering hospital for their confinements testify to the fact that maternity work is appreciated. Child welfare work is rendered difficult and unnecessary sickness results from methods of unsuitable feeding of young children, combined with general insanitary living conditions. Records maintained at the Bremerdorp Welfare Centre show that out of 555 live-born children 147 died during the first year of life 38 during the second and third years and 16 during the fourth and fifth years. The Matron of the Mahamba Dispensary (see hereafter) has started a class for the instruction of native women who attend confinements in the kraals. At the first class only three women attended but in the fifth class the numbers had increased to fourteen. Home nursing and first-aid classes were also started for adult women and senior school girls.

School Hygiene -- European schools and school children were examined during the year the records showing that dental caries was the universal defect. One of the greatest needs of the Territory is a resident dentist. At present the most favourably situated school is 24 miles distant from the nearest dentist, and some of them 100 miles away. In the Central District especially at Step, there were many cases of enlarged tonsils and in the Southern District, notably at Hloti, enlarged spleen and secondary anæmias, due to chronic malaria, were prevalent. At Bremerdorp where schistosomiasis is prevalent no child resident in the area for not less than a year was infected, nor was one found showing enlarged spleen. This satisfactory state of affairs is attributed to the efficient treatment by medical officers of the Raleigh Field Memorial Hospital.

Public Health Sanitation, etc. -- During 1934 there was no serious outbreak of infectious disease. The incidence of general diseases was not above the average, and subtropical malaria less severe than that experienced during the two preceding years. Free and adequate distribution of quinine through the medium of chiefs, missionaries, police posts, schools, etc. in affected areas, was carried out. There is no trypanosomiasis, yellow fever, filariasis or typhus in the Territory.

Problems of general sanitation, water supplies, etc. in the interests of the natives present unusual difficulties, since these people live under primitive conditions in scattered and isolated kraals housing few inmates. In these circumstances little can be done at present. As regards the towns where sanitary arrangements are under the control of sanitary inspectors sewage disposal is by the bucket system and the contents disposed of by night trenching in approved places. Septic tanks have been installed at some of the larger hotels, private houses, hospitals, etc. The Medical Officer Southern District, suggests the erection of native latrines at intervals along the bus route a proposal which might well be extended to the Northern and Central Districts also.

Bremerdorp is the only place with a really satisfactory water supply. The Mbabane supply still conveyed in an open channel and unfiltered, proves on analysis quite unfit for human consumption. Europeans use this water only for their gardens, drawing their supplies for domestic use from three springs in the township area. The supply to the native

location is satisfactory. Supplies in certain areas of the Southern District are potable but inadequate, and the tapping of other sources is suggested. The Stegii supply still remains short (see this *Bulletin* 1933 Supp., p. 84*) and water has to be carted from a shallow well liable to pollution.

The food of the natives is mostly maize insufficiently supplemented by pumpkins underground beans and a local spinach little meat is consumed and diets suffer from a shortage of protein. Cases of scurvy and pellagra occur every year it is observed "a large percentage of the population is on the verge of scurvy in the spring An up-to-date abattoir was erected in Bremersdorp and having regard to the primitive slaughtering arrangements in Mbabane one should be built there also

Labour Conditions — There are no estates factories plantations or offensive trades the only employers of native labour on a fairly large scale being the Administration and the Tin Mines. The Tin Mines are alluvial, there is no underground mining and the work is healthy

Housing and Town Planning — Schemes are controlled by Village Advisory Boards responsible for ensuring that new buildings comply with regulation requirements.

Recommendations for Future Work — The Mbabane water supply constitutes a serious public danger and should be replaced by a system guaranteeing pure supplies and that supplying Hlatikulu should be augmented. More Medical Outposts should be established and steps taken for dealing effectively with the breeding places of *Aedes vexans*

Hospitals Dispensaries Clinical Returns etc — Hospital figures again exceeded those recorded during the preceding year In patient cases at the Hlatikulu Hospital showed an increase of 55 per cent. mainly due to the closing down of the Mahamba Mission Hospital and to the increasing popularity of hospital treatment on the part of the natives. On many occasions at this hospital the numbers of patients exceeded the number of available beds and tents had to be raised in the hospital grounds for their accommodation. Extensions to existing accommodation have been made possible by the provision of a grant from the Colonial Development Fund.

Work began on the building of the new nurses quarters. Two new dispensary centres were opened, one at Goedgegen, in the Southern District, and the other at Mahamba, replacing the Wesleyan Mission Hospital, which had been closed down. The former is in charge of a European nurse of wide experience having the additional advantage of perfect knowledge of the English, Afrikaans and Swazi languages the Mahamba centre is under the charge of the former Matron of the Wesleyan Mission Hospital, this lady having an unusual flair for the instruction and training of natives (see above under *Maternity and Child Welfare*)

These two dispensaries will considerably relieve the single over-worked Medical Officer of the Southern District within which area are domiciled two-thirds of the European and two-fifths of the native population.

The year saw the setting up of an experiment of some interest—viz. the introduction of *medical outposts* under the charge of natives and established in areas remote from hospitals and dispensaries two were opened and a third was in process of organization. These

centres are doing useful work, but their full value will not be realized until they are staffed by men of higher standard of education and more extensive medical knowledge and training.

In-patients at the Raleigh Fitkin Memorial Hospital, Bremerdorp, numbered 820 (520) and out-patients 11,130 (8,726). At the Mbabane Hospital in-patients totalled 439 (520) and out-patients 7,115 (8,446); at Hlatikulu Hospital the numbers were 451 (291) and 8,405 (8,255), respectively. Cases treated at dispensaries were as follows—

Mankana 3,358 (3,356) Endengeni 8,490 Steg 1,613 Pigg Peak 3,133 Goedgegen (four months) 1,031 and Mahamba (seven months) 2,603.

There is a curious agreement with returns for 1933 and 1934 for in-patients at Bremerdorp and out-patients at Endengeni, Steg and Pigg Peak totals for each of these two years are precisely the same.

Malaria is practically the only insect-borne disease. During 1934 this was less severe than usual. It was confined to areas where outbreaks are normally expected to occur and did not spread to others usually malaria free. The disease was responsible for 19 per cent. of all cases treated at Government hospitals. At Mbabane Hospital 52 (29) in-patients received treatment and at Hlatikulu 36 (39). Numbers of cases treated at other centres are not mentioned.

Cases of *enteric fever* numbered 33 (19) distributed as to 19 from the Southern District, 13 from the Central and one from the Northern. Improved means of communication and extension of medical service are probably responsible for increase in the numbers of cases. No epidemic of the disease was reported from any area. Risks of infection in the Northern District are fewer than elsewhere by virtue of the hilly nature of the country, fast-flowing mountain streams (water supplies) and isolated kraals, sparsely populated. Returns of two hospitals show that 13 (10) in-patient cases were admitted for diagnosis, 11 of these being the amoebic form of the disease. The returns give no indication of actual prevalence.

The Report speaks of an epidemic of measles during the year, prominently in the North, and gradually extending to the Central District but the only returns available from hospitals at Mbabane and Hlatikulu report 5 cases with no deaths. The Report contains

It (measles) was followed by gastro-enteritis which caused five deaths than the original disease." but here again, the total cases mentioned above were 42 with 6 deaths.

The number of cases of leprosy remains about the same, the Report observing "there must be at least 100 lepers in the Territory". A settlement was started in the Mankana district for the few San leper repatriated after treatment at Pretoria. The Hospital Trust at Mankana visits them once a week and gives necessary injections.

Helminthic Diseases.—Taeniasis and ascariasis are very common though schistosomiasis is the most serious helminthic disease experienced. As a result of persistent treatment there are few cases among Europeans but there is no appreciable diminution in the number of cases. No data are supplied.

In the absence of complete numerical statements the following among other general observations recorded in the Report—

Information.—"There is no doubt the disease is a swift but slow one to become." In another place "There is no time to suppose that there are more cases of asthmas than in the previous year." Between Jan. 1st and Aug. 1st 1925 there were 41 cases of which 24 (57%) were permanent.

Treatment.—"The General Office authorities continue to do an excellent amount of work. There was an increase in the number of replies reported from the Southern and Central Districts but an absolute diminution of the disease in the 'Tuberculosis'."

"Gonorrhoea is very common indeed." Persons from two hospitals give 175 cases in 1925 amongst 3,

Gonorrhoea.—"The most common disease is gonorrhoea due to improper food, poor diet, and lack of exercise."

"The outstanding feature of their experience is the number of asthma bronchitis in fact present in the cold air, the parts of the country."

"Except amongst the poor classes asthma attacks were usually gradual and chronic pulmonary disorders and of various kinds."

"Except amongst the poorer classes we find, particularly amongst the lower classes especially children, come, rheumatism, and even constitutional, 'nervous disease' are typical."

Treatment of Natives.—This work will be given by the Gold Prospecting Committee of the Western Australian Chamber for the furtherance of medical work amongst the natives of Tasmania, will be commenced in 1926. With the £2,000 Tasmania's share of the cost, it is proposed to give native men four or five years training in elementary anatomy and surgery, hygiene, brachy, maternal and child welfare work, and send them over to the charge of medical officers at the various hospitals, and generally assist the authorities. This may be considered admissible. Their should be of a few people.

Financial.—Total expenditure amounted to £13,827 comprising 11.5% per cent. of the total revenue of the

NORTH AFRICA

SUDAN (1934)

The Sudan is bounded on the north by Egypt, east by the Red Sea, Eritrea and Abyssinia, south by the Uganda Protectorate and Belgian Congo, west by French Equatorial Africa. Its western and northern frontiers meet in the Libyan desert. The greatest length north to south is approximately 1,300 miles and from east to west 1,200 miles. Its total area is about 1,003,100 sq. miles.

Total Statistics.—Population figures in native cities and towns can only be approximate. The people are naturally suspicious of the reasons for taking a census, and it is especially difficult to obtain figures for women and children. In spite of defects the Report observes that the population figures are believed not to vary greatly from year to year and they are of some value in measuring the incidence of disease computing crude birth and death rates, etc.

The Report, however, supplies no estimated population figures for the Territory as a whole nor for any of the ten Provinces, other than that of Khartoum the population of which was estimated as 260,239 (252,220). Population data relating to certain localities within the Province of Khartoum are supplied—viz. Khartoum 46,676 (49,741); Khartoum North 21,131 (18,449); Omdurman 110,859 (110,418); Gebel Auha 8,120 and Rest of Rural District 73,403 (73,584). As regards other areas in the Sudan, the population figures for three centres are given—viz. Wad Medani (Blue Nile Province) 33,000; Atbara (Berber Province) 19,757 and Port Saidan (Red Sea Littoral) 19,000.

Though improvement is noted in the registration of births and deaths the returns relating to most provinces are still incomplete. The data assembled in Khartoum, Berber and Dongola Provinces, and in the Wadi Halfa District are regarded as reasonably dependable, while those for the Blue Nile Province are less reliable. For these areas the details are supplied in the Table on p. 91.

The figures call for comment. Of the four provinces and one district mentioned, the estimated population is given only for the Province of Khartoum. That population figure 260,239 related to the 4,013 births recorded in the province during 1934 gives a birth rate of 15.4 per 1,000—a figure which differs from the birth rate quoted in the Table. On the other hand, if the published birth and death rates are related to the absolute number of births and deaths recorded, it should be an easy matter to calculate the population. When this is done, however, it will be found that the two calculations give different results—viz. —

(Population estimated)	Khar town	Berber	Dongola	River Nile	Wad Halfa
(1) On basis of birth rate 1934	47,716	183,722	157,963	496,818	60,866
(b) On basis of death rate 1934	249,495	189,149	158,778	496,123	60,371

These results suggest that different population figures were used in the calculation of birth and death rates. Another item of importance is concerned with the figures under various headings during the past

four years. It would be well to know what causes have produced such striking changes in the Blue Nile Province. In 1931 no less than 18,308 births were recorded, but during the following three years the number declined steadily and rapidly to 1,934 when only 8,658 registrations were effected. The same sort of remarkable decline characterizes the figures relating to deaths, infant deaths and stillbirths in this and other provinces.

Infant mortality rates are strangely low in some areas and for some years. The Donegal rate for 1934 is below that for England and Wales for the same year and that for the Blue Nile only 0.8 per mille higher than the English rate. Limits of space forbid the further discussion of these and other strikingly curious differences, which call for explanation for without such explanation the use of these data may prove dangerously misleading.)

Additional particulars regarding infant mortality in the three towns of Khartoum, Khartoum North and Omdurman are supplied and are probably much more reliable than data from more remote areas. In these three towns 271 infant deaths were recorded with an infant mortality rate of 85 per 1,000 live births. The principal causes responsible for these deaths are debility, malnutrition and prematurity 26 per cent; diarrhoea and enteritis 22 per cent; respiratory affections 20 per cent "fever" (including malaria) 17 per cent.

As regards the 4,647 officials employed in Government service, 785 were British, 3,145 Sudanese, 573 Egyptians and 42 Syrians. There were 2 (2) deaths among British officials, 8 (10) Sudanese, 3 (4) Egyptians, while no deaths of Syrians were recorded either in 1934 or 1933.

Maternity and Child Welfare—Only for towns where the population is served by trained midwives and in which ante-natal and child welfare clinics are established is it possible to assemble information under this heading.

The returns of the civil and Church Missionary Society's hospitals in Omdurman of the Midwifery Training School, and the trained town midwives in Omdurman, record 840 maternity cases with 11 deaths; there were 883 deliveries, of which 846 were of live-born babies and 37 stillbirths. Reports and returns from such centres, while not typifying the country as a whole do supply some indication of the complications of pregnancy and childbirth conducted under the best available conditions.

At the School of Midwifery Omdurman, 23 pupil-midwives were trained during the year and passed out successfully. It is of interest to note that since the School was opened 14 years ago, 220 midwives have been trained and no less than 185 are still in practice in various parts of the country. At the Nurses' Training School 20 pupil-nurses were under training, 8 of whom commenced the course in 1934 and 12 in 1933 while 8 nurses passed the final examination during the year and were posted to various provincial hospitals.

There are now 8 ante-natal and child welfare clinics established, two new centres having been opened during 1934. The work which has increased considerably serves a most useful purpose in that many obstetrical cases requiring special treatment and which in the absence of clinics would be missed, are now admitted to hospital. At the Khartoum Provincial Clinics 5,325 (2,428) attendances were recorded.

and of these 1 763 were new cases. This means that new cases seeking advice of the clinics represented 43 per cent of the total births registered in the province.

School Medical Service—School children examined during the year and provided with necessary treatment numbered 22,751 compared with 18,160 in 1933. In all 304 schools were visited comprising 207 village, 80 elementary, 14 intermediate, 2 secondary and 1 technical schools. Of the total number of examinees 7,650 or 33·6 per cent. were trachoma cases 4,635 or 20 per cent. showed enlarged spleens while 1,690 or 7 per cent. were infected with bilharzia. The Report states that special attention is being paid to Halfa Province where the incidence of trachoma among school children is still high 42 per cent. of the children examined. [Why this province is selected for mention is not stated for it is observed from the published data that 74 per cent. of school children examined in Dongola Province 64 per cent. in Darfur Province and 47 per cent. of those in Berber Province exhibited this diseased condition.]

The School Medical Service in Khartoum is now fully developed, and the beneficial results are already seen in the improved health of those entering the Gordon College particularly with regard to eye diseases.

Public Health Hygiene Sanitation etc—The effects of improved economic conditions and good crops are reflected in a noticeable decrease in the incidence of disease in certain provinces while with the exception of a severe epidemic of cerebro-spinal meningitis in the Juba Mountains and sporadic cases in some areas the general health throughout the Sudan was satisfactory. The general health of the native appears to be on the up-grade, and his resistance to endemic disease shows a slight but steady improvement.

Steady progress in the extension and improvement of the sanitation of areas is reported. The problem of overcrowding is receiving attention, insanitary centres have been cleared up and the policy of replacing bucket by pit latrines where conditions are favourable has been continued. Future efforts are to concentrate upon the improvement of diet, housing and living conditions of the people in their villages. Preliminary investigations into the natural diet of the people, its deficiencies economic and nutritional value have already commenced.

Special consideration has been devoted to the question of housing and efforts are being made to improve and control the type and lay out of new huts and dwellings bearing in mind that in the construction of houses latrines wells markets etc. the question of materials normally available to the native must receive attention.

Purification Plants and Piped Water Supplies are installed at Khartoum, Omdurman, Wad Medani, Abu Usher and Juba, while the Egyptian Irrigation Colonies at Malakal, Gebel Aulia and Gordon's Tree Dockyard are similarly provided for. The bulk of the population draw their supplies direct from the Nile and its tributaries or from wells while in the Gezira irrigated area villagers draw their water from neighbouring canals. This practice gives rise to some anxiety for during certain periods the water is apt to become contaminated. With a view therefore to prevent the spread of bilharzia and other water-borne diseases the villages have not only been encouraged to

reopen well supplies but the systematic re-siting of villages at a minimum distance of 300 metres from the nearest canal is being undertaken. In the Blue Nile Province 94 villages were moved during the year. Experiments have also been carried out to determine the value and dosage of chlorosene and ammonia in the purification of water with such satisfactory results that the method has been adopted on a large scale.

There are 15 British Sanitary Inspectors distributed as to 7 in Khartoum, 5 in the Blue Nile Province, 2 in the Berber Province and 1 in Port Sudan. Working under the supervision of these officials are natives styled Sanitary Overseers, who have been trained by the British Sanitary Inspectors. Their duties include supervision of conservancy work, the detection of nuisances, anti-malarial work, etc., while in areas where there are no British Sanitary Inspectors they act as Sanitary Inspectors under the supervision of the local Medical Inspector. A new type of Sudanese official has made his appearance under the label of *Sudanese Sanitary Officer*. These men undergo a three years' course of training after selection from the Science Class of the Gordon College—the first two qualified in December 1934, and two more students commenced their training at the beginning of the year. It is anticipated these officers will fill the less responsible posts at present held by British sanitary inspectors.

Quarantine and Pilgrimages—4,021 Egyptian labourers passed through the Wadi Halfa station. 27 were repatriated as unfit, 413 were found to be suffering from ankylostomiasis and 823 were treated for bilharziasis, either at Wadi Halfa or at Gebel Sileftat.

Outgoing pilgrims via Suakin numbered 1,459 (797) of whom 534 were Sudanese and 925 were West Africans. All were vaccinated against smallpox and received a single anticholera inoculation. The general health of returning pilgrims was satisfactory. There were 9 admissions to hospital and 2 deaths—1 pneumonia and 1 infant overland. Returning pilgrims numbered 1,571 (797)—601 Sudanese and 970 West Africans. All these underwent quarantine the period of detention being increased from five to eight days, as two cases of smallpox developed in the first batch of pilgrims. Other members of the group in which these cases occurred were re-vaccinated and no other cases were reported.

Training Medical Sanitary etc—Of the 37 students on the roll of the Kitchener School of Medicine 4 were Sanitary and the remainder Medical students. Of the latter 10 (10) were admitted during 1934. A system of class examinations held at intervals throughout the year similar to systems in force in British medical schools has been adopted. On the results of these examinations the Registrar decides whether the work of a student warrants continuance of medical studies. During the first term a course of lectures on Mental Diseases was given to fourth year students and graduates by Dr D. R. Macdonald. The Report observes that Sudanese Medical Officers trained at the school are holding responsible posts in charge of the larger hospitals previously held by highly paid foreigners, and have successfully replaced the excellent type of Syrian doctor who served the country so well in the past.

Ten (15) Assistant Medical Officers (*see this Bulletin 1935, Sept. p. 88*) passed out during the year and were posted to dispensaries.

The first two Sudanese Sanitary Officers (see under Public Health above) qualified at the end of the year while 5 Laboratory Assistants passed and were posted to hospitals. A new departure during the year was the introduction of a scheme for the higher training in nursing and hospital routine of Hospital Orderlies. The course covers six months and during 1934 was organized in the Khartoum Civil Hospital.

Hospitals Dispensaries Clinical etc—It is a little difficult to understand the conflicting figures relating to hospitals and dispensaries appearing in the Report. For example Table IV records 40 hospitals and 286 dispensaries established in various parts of the country yet Table II which is held to supply particulars of admissions to and deaths in Hospitals makes mention of no less than 58 stations under this heading. Again in Table V which purports to provide a "List of Hospitals and Dispensaries" the totals are at variance with the data in Tables II and IV. In future Reports it may be considered advisable to ensure that hospitals and dispensaries are clearly differentiated, and that numerical references to these institutions when appearing in different parts of the Report are in agreement.

From available returns it appears that hospital in-patients during 1934 numbered 85,990 (70,315) of whom 443 were Europeans and 85,547 natives. The deaths of 11 Europeans and 1,910 natives were recorded. In addition 6,039,197 (5,092,999) persons received treatment as out patients. The number of dispensaries has steadily increased during the past ten years. 21 new dispensaries were established during the year and with the completion of the programme of expansion about 300 dispensaries will bring treatment within reasonable distance of sufferers in all parts of the country.

In addition to Government institutions the Mission Hospitals and Dispensaries carry out valuable work and are an inspiring example of what can be accomplished with slender resources by the exercise of enthusiasm self-sacrifice and unremitting personal effort. The Church Missionary Society maintains three hospitals and four dispensaries; the Sudan United Mission one hospital and three dispensaries; the American Mission one hospital and three dispensaries; and the Italian Mission one dispensary. Returns available from three centres only record a total of 1,730 in-patients and 57,861 out patients treated during the year. Of these 1,346 in-patients and 55,064 out patients were treated at two Church Missionary Society hospitals and the remainder at the Sudan United Mission hospital at Melut.

For the greater number of titles of *Communicable Diseases* the Report supplies no numerical descriptions by means of which readers may arrive at some comparative assessment of the incidence of this or that disease in the country. Only for the Province of Khartoum is such information available and for that area 15 titles are listed with the numbers of cases notified during the year against each. For the rest it is possible to discover from the analysis of Hospital Returns that 145,977 cases of *malaria*, 3,296 of *ankylostomiasis* and 14,074 of *bilharziasis* were treated during the year and elsewhere to find that 4,231 cases of *cerebrospinal meningitis* with 3,341 deaths, 2,823 cases of *dysentery* of which 2,578 were amoebic and 245 bacillary, 34 cases of *diphtheria* with 8 deaths, 197 cases of *smallpox* and 34 cases of *blackwater fever* with 9 deaths were recorded. These and other diseases are commented upon hereafter.

Cerebrospinal Meningitis — 4,231 (186) cases and 3,341 (131) deaths were reported during the year. A severe outbreak occurred in Kordofan Province. The first case was reported on 9th January at El Obaid, but in the Eastern part of the province a case was reported on 10th March from Rashad, in the Nuba Mountains; the disease spread rapidly to surrounding villages and before the epidemic died down with the onset of the rains in May 1,798 cases, with 1,393 deaths, had been reported from this area. Overcrowded housing conditions were ideal for the spread of the disease while the inaccessibility of villages in high rocky mountains made early information of outbreaks difficult to obtain. The disease next spread to the plains north of the Nuba Mountains 164 villages became infected, 1,485 cases with 1,163 deaths being reported.

A second epidemic broke out in the Province in November six weeks after the rains ended, and immediately south of the area where the first epidemic had occurred 18 centres were infected with 142 cases and 89 deaths.

The total figure for Kordofan Province was 4,108 cases and 3,251 deaths case fatality was 79 per cent. 78 per cent. of all cases were under 20 years of age 63 per cent. under 15 and 43 per cent. of all cases were females. Steps taken by the authorities to combat the spread of the disease included quarantine of cases and contacts, evacuation of houses and villages neighbouring villages warned and advised to cease communication with infected areas, etc. prohibition of dances and public assemblies. A striking feature of the epidemic was that coincident with the onset of the rains there was a sudden cessation of cases.

An outbreak of the disease occurred in May also in Khartoum Province when 89 cases, with 67 deaths, were recorded. Sporadic cases were also reported from the provinces of Mongalla, Blue Nile, Berber White Nile, Kassala and Bahr-el-Ghazal.

Malaria — The situation as regards malaria has improved considerably during recent years. Formerly epidemics of acute malaria swept over the Northern and Central Sudan periodically with heavy loss of life. The establishment of a network of dispensary centres providing the means of ready treatment within reasonable distance of all coupled with application of anti-malarial measures and sanitary precautions, carrying with them the code of proved value have played their part in bringing about a general improvement throughout the country 145,977 (161,886) cases were treated at Government hospitals and dispensaries there were 9,557 admissions to hospital, and of these 9,483 related to natives and 74 to Europeans.

In Berber Province the exceptionally high flood left ideal conditions for mosquito breeding and the consequent outbreak of epidemic malaria. The medical and sanitary organization dealt satisfactorily with the situation and the incidence of the disease was not appreciably raised. In the Gezira malaria is by far the most important endemic disease and special efforts were made during the year to ensure that as far as possible breeding places of mosquitoes were eliminated. Earlier work by the malariologist having suggested that children were the usual gametocyte carriers an experiment was instituted aiming at the elimination of gametocytes from the peripheral blood, and to this end all the children in one block were given plasmoquine twice a

week, from 1st October to 31st January. The experiment has not yet been completed. A second experiment involved the oiling of the field channels of the cotton numbers in two blocks from the first watering, about the end of July until September when baling is enforced. It was found that the number of pools infected with mosquito larvae in the control block was four times that of the oiled blocks. This experiment is to be extended during the next rainy season.

In the Southern Sudan malaria is still widespread and is probably one of the principal causes of infant mortality in adult life the natives show a high immunity to the disease. Here the malaria problem is dealt with by the dispensaries and usual anti-malarial precautions as elsewhere.

As to the incidence of the three types of malaria throughout the Sudan, it is observed that of 6,543 cases recorded 3,671 or 56.1 per cent. were subterian 2,748 or 42 per cent. benign tertian and 124 or 1.9 per cent. quartan.

In Khartoum Province the malarial incidence compared very favourably with that of recent years while the general mosquito incidence was much lower than usual. 2,290 (2,924) cases were notified of which 396 (604) were imported and 382 (545) relapsed cases. Of the total cases recorded 57 were apparently primary infections and of these 37 or 64.9 per cent., were subterian, 18 or 31.6 per cent. benign tertian, and 2, or 3.5 per cent. mixed infections.

There were 48 (115) cases among British troops the types of infection being subterian 24 or 50 per cent. benign tertian 18 or 37.5 per cent. mixed infections 2, or 4.2 per cent. undetermined 4 or 8.3 per cent.

Average strength of the Sudan Defence Force was 4,715 (4,919) and there were 1,185 (1,140) admissions to hospital for malaria. The increase was noted among troops stationed in Khartoum, where fresh infections and relapses were incurred on patrol work and in Darfur where exceptionally heavy rains were experienced. Hospital admissions per 1,000 strength were Khartoum 136.1 (77.0) Camel Corps 258.1 (298.8) Eastern Arab Corps 418.0 (428.9) Western Arab Corps 306.4 (117.8) and Equatorial Corps 70 (101.4).

Blackwater Fever—34 (38) cases with 9 (12) deaths were reported, 22 cases with 8 deaths being hospital patients. There was noted a decrease in the incidence of the disease corresponding with the decrease in the malaria rate throughout the Central and Northern Sudan.

Dysentery cases admitted to hospital numbered 2,823 (2,553) of which 2,578 or 91.3 per cent. were amoebic, and 245 or 8.7 per cent. bacillary dysenteries. In Khartoum Province 216 (513) cases of amoebic dysentery and 33 (47) of bacillary dysentery were notified of the latter 12 cases occurred among British troops. In 8 of the bacillary cases the organism was not defined, but of the 25 remaining cases 13 were *Bact. dysenteriae* (Flexner) 10 *Bact. dysenteriae* (Schmitz) and 2 *Bact. dysenteriae* (Shiga).

Enteric Fever was responsible for 188 (204) cases and of these 6 related to Europeans and 182 to natives. 22 deaths were recorded, all amongst native patients. 173 (181) of the total cases were typhoid 7 (13) paratyphoid A, and 8 (10) paratyphoid B. The provinces principally affected were Khartoum Province 101 (96) Halfa 18 Upper Nile 17 (9) Blue Nile 14 (13) Dongola 11 (37) all cases in the Upper Nile Province occurred in the town of Malakal. Of the 101 cases

occurring in Khartoum Province 20 (24) were in Khartoum City 24 (34) in Omdurman 2 (7) on Khartoum North and 5 were "imported" 8 (7) patients died giving a case fatality rate of 7.9 per cent. (7.2 per cent.) 95 of the total cases were *Bac. typhosum* infections, 1 *Bac. paratyphosum A* and 5 undefined. No definite source of infection could be traced.

Smallpox cases numbered 187 with one European death. The mild variety of the disease was again endemic (see this Bulletin 1933, "Supp., p 91") in the Provinces of Bahr-el-Ghazal and Mongalla, giving rise to 167 and 24 cases respectively in these areas—the War (Bahr-el-Ghazal) garrison of the Sudan Defence Corps was affected, 81 mild cases being admitted to hospital. Four cases of a more severe variety of the disease with one death were reported from Hassala Province—all these cases occurring among Arabs infected in Egypt. Primary vaccinations carried out during the year totalled 123,047 and revaccinations 2,811. There were 34 (51) cases of diphtheria notified, with 8 (4) deaths. Undulant fever gave rise to 51 (25) cases and 3 deaths of the total cases recorded 21 occurred in the Province of Hassala and 17 in the Blue Nile Province.

There were 540 admissions to hospital for chickenpox during the year. Only a small proportion of cases report for treatment unless a coincident outbreak of smallpox has frightened the population into seeking advice for "false smallpox." In Khartoum Province 149 (36) cases were reported, and there is little doubt that a considerable epidemic was prevalent throughout the year.

Rabies is endemic in Central and Northern Sudan. Wild animals, and particularly hyenas and jackals act as reservoirs of the disease and constant vigilance is necessary to control the disease. The numbers of dogs are kept as low as possible. Government officials are prohibited from keeping dogs in Darfur Province and in parts of the Provinces of Kordofan and Kassala where the disease is prevalent. In spite of all precautions 8 (12) human cases were notified—all were natives and all died, 4 after a full course of treatment, 1 after eight injections 3 untreated. 2 of the last named were not seen by medical inspectors. 197 persons received prophylactic treatment during the year.

As regards leprosy the disease incidence in the Northern Sudan is said to be low and of little importance. In the Southern area, especially in the southern districts of Bahr-el-Ghazal and Mongalla, it constitutes a serious public health problem.

The leper settlements in Mongalla Province record a total of 214 (582) cases. It is believed that all infectious lepers are now in settlements, as comparatively few new cases are diagnosed. A new settlement east of the river at Hoggi was opened during the year.

In the Province of Bahr-el-Ghazal the position is not so satisfactory for although nearly all infectious lepers are under observation and treatment at the settlements, many fresh cases are still diagnosed in outside districts. It is believed that may be an important factor owing to tsetse fly cattle do not exist, and the people are meat and milk-starved. The experiment is being tried of introducing a large number of goats into the area and a few cattle relatively immune from fly from the Koalib Hills in the Nuba Mountains.

At the Li Rangu Leper Settlement 1 156 (1 368) lepers are under treatment. Treatment of all but the advanced cutaneous and nodular cases with chaulmoogra derivatives met with some definite measure of success of the latter drugs intramuscular sodium gynocardate was found to be least painful and most effective. Lepers in the settlement at Tembura averaged 400 (500) during the year—56 per cent. were cutaneous cases. At Bakango the average number segregated was 130 (103) of whom 64 (53) were males 37 (34) females and 19 (16) children. There were at the end of the year in the Wau Settlement 31 males 26 females and 1 child during the year 16 admissions were recorded 5 deaths and 3 discharges.

A scheme has been started to bring the lepers of Darfur Fung Province and Nuba Mountains under treatment and observation. In Fung Province the settlements opened at Singa in the northern area and near Roseires for the southern districts are supervised by the respective hospitals. In Darfur Province 87 new cases were under treatment during the year while in Nuba Mountains (Kordofan Province) settlements are being established near the dispensaries in this area the incidence of the disease appears to be higher than was previously supposed—367 cases were treated of which 271 showed signs of improvement.

Ankylostomiasis—Total cases of *ankylostomiasis* treated in hospitals numbered 3,296 (1 038) and 17 deaths of natives were recorded. In the Northern Sudan the disease is said to be no longer a factor of importance though in the southern provinces notably at Rumbek and Wau in the Bahr-el-Ghazal Province it constitutes a definite menace to public health. At Wau 880 cases were treated, at Tonj 316 and at Rumbek 62. In Mongalla Province routine examination of stools indicated a highly infected population. 206 (62) cases were diagnosed, this increase being largely due to better laboratory diagnosis. In Khartoum Province one record makes mention of 18 cases but a later reference to the Gebel Aulia district states that out of 200 faecal examinations 25 per cent. were found to be infected, and that the disease was one of the chief causes of invaliding and loss of time amongst Egyptian labourers.

Hospital returns for the whole Sudan record 14 074 (8 536) cases treated for *schistosomiasis* during 1934. The situation as regards the disease remains the same in the irrigated area of the Gezira (see this Bulletin 1935 Supp. p 94*) Rectal *schistosomiasis* has been found to have a wider distribution than was formerly supposed, especially in the Bahr-el-Ghazal and Fung Provinces. In the irrigated area of the Blue Nile Province the incidence of the disease amongst the indigenous population remains negligible the re siting of villages treatment of canals with molluscicide and other precautionary measures have kept the disease under control. During the year of 23,848 persons examined, only 96 or 0·40 per cent. were found infected. The dispensaries in the north of Berber Province afford treatment within reasonable reach of the population while in the south sanitary efforts have been successful to date. In Zeidab a small focus of *S. mansoni* was found and necessary steps taken to deal with this in three villages 167 people were examined and 93 or 55·7 per cent. were found to be infected. An annual *schistosomiasis* survey is carried out in Dongola Province annually.

infected persons are treated and steps are taken to deal with the malusc. Of 46 054 (58 711) persons examined 1 768 (1,825) or 3.8 per cent. (3.1 per cent.) were found to be infected. The posting of a British doctor to Wadi Halfa enabled similar preventive measures to be carried out. 20 180 persons were examined, 3,927 infected, a percentage of 19.5. In the White Nile Province 12 wells were dug in infected villages to provide alternative water supplies replacing potent sources of schistosomiasis in the province while in Kordofan Province the incidence of the disease has decreased appreciably as a result of extensive treatment. In Khartoum Province 62 cases were recorded. *Dirocosmus* is endemic in the Southern Sudan. In the Upper Nile Province 217 cases were treated, Bahr-el-Ghazal 189 and Mongalla Province 482 though the numbers are still high in the latter province they are steadily decreasing. Hospital admissions in the Sudan Defence Force for this disease totalled 111 (41). The increased incidence was confined to Torit where 69 cases were reported against 4 in 1933.

There were 894 (815) cases of tuberculosis admitted to hospital, of which 557 (521) were pulmonary. Of the total admissions recorded 785 (771) with 452 (418) pulmonary cases relate to the Northern Sudan, and 199 (144) of which 105 (102) were pulmonary to the Southern Sudan. No cases were found during the routine examination of 22,731 (18,160) school children. Arrangements made for subsequent disposal of case after notification remain as previously described (see this Bulletin 1935 Supp. p. 92*). The highest incidence of the disease is said to be in the Dongola Province from which domestic servants proceed to Egypt where they live under conditions favourable to the propagation of the disease many return suffering from pulmonary tuberculosis. A somewhat similar state of affairs exists in Kassala, another frontier province, starving Abyssinians entering the area are a constant menace to public health.

Of *kala azar* 286 (202) cases were treated, with 46 deaths. Of the total cases recorded 133 were adult males, 87 male children, 24 female adults and 45 female children. The geographical distribution of the disease remains the same (see this Bulletin 1935 Supp., p. 92*). The highest incidence of the disease occurs in Fung Province, where 121 (81) cases were reported and of these 92 received hospital treatment. In this province, investigations regarding the etiology of *kala azar* are being carried out by the Director of the Wellcome Tropical Research Laboratories in collaboration with Dr. Henderson, the Senior Medical Inspector in charge. 86 (58) cases with 2 deaths were reported from Mongalla Province, 58 of the cases occurring among children. 11 (17) cases with 3 (4) deaths occurred among personnel of the Sudan Defence Force.

Eye Diseases—These form a large proportion of ailments treated according to hospital returns 232,614 (196,897) cases of trachoma alone were recorded during the year. The incidence of the disease has been the subject of brief comment in the section discussing "School Hygiene" above. The special report of the Ophthalmic Surgeon supplies interesting details of cases and treatments at the River Hospital, Khartoum, and at the Omdurman Hospital. In-patients at these two institutions numbered 326 and out patient attendances 46,945 of these totals the River Hospital dealt with 305 (161) in-patients and 13,983 (11,044) out patients attendances were recorded. At this hospital 4,310 persons

attended for trachoma treatment as out patients the severe cases complicated by iritis marked pannus keratitis and ulceration to the number of 58 being admitted to hospital. For *conjunctivitis* other than trachoma, 4,527 attended the out patient department 30 cases showing purulent or mucopurulent discharge being admitted. *Pterygia* cases are common and are treated as out patients 575 attendances among such cases being recorded. The Ophthalmic Surgeon was able to visit the Bahr-el-Ghazal Province to assist Dr Bryant in his investigations into *onchocercal keratitis* and *Sudan blindness* (see this *Bulletin* 1934 Supp p. 85* and 1935 Supp p. 95*-6*) All the cases of onchocercal keratitis showed tumours containing filaria or thickening of the skin with microfilaria in the smears obtained on puncture. Almost all the cases seen of *Sudan blindness* also showed onchocercal manifestations.

Sleeping Sickness—The heavily infected districts bordering the frontiers were largely responsible for sporadic cases in the Mongalla and Bahr-el-Ghazal Provinces the most stringent administrative measures fail to prevent a certain amount of illicit traffic across the border. A total of 32 (83) cases was reported, 22 (82) from Bahr-el-Ghazal and 10 (1) from Mongalla Province. Of the Mongalla cases 7 were infected outside the Sudan 3 in the Belgian Congo and 4 in Uganda. A large staff is engaged in preventive work 563,798 medical examinations were carried out during the year.

In the returns of hospital in patients and out patients *syphilis* and *yaws* appear under a single heading and it is recorded that 89,253 (91,248) cases of these diseases were treated during the year. Admissions to hospital for syphilis numbered 10,273 and included one European male there were 2,092 admissions including 5 European males for *gonorrhoea* 481 for *soft sore* and 1,209 for *yaws*. Thirty seven deaths were ascribed to syphilis 3 to gonorrhoea, and 5 to yaws. The incidence of yaws is said to be decreasing and is now a rare disease except in a few remote districts of the Southern provinces. The use of Benzyl and Sobita instead of Novargenobenzol has enabled work against the disease to be undertaken on a large scale. As regards syphilis the general belief seems to be that the incidence is decreasing also.

Other items of interest and importance in the Report have reference to *tumours* and *yellow fever* 626 (659) tumour cases were admitted to hospital during the year and of these 166 (183) were classified as "malignant." 97 of the latter occurred among males and 69 among females and with two exceptions all were native cases the racial distribution being Arabs 77 per cent. negroid 18.7 per cent. and others 4.2 per cent. 25 native deaths and 1 European death were recorded. Of the 460 benign tumours 454 related to natives. As regards yellow fever special investigations have been carried out by Dr HEWER of the Wellcome Tropical Diseases Research Laboratories in collaboration with the medical staffs in the provinces concerned. These consisted of collection of sera from suspected districts which were examined by the Rockefeller Laboratories New York by the biological test and the examination of liver sections from post-mortems carried out in these areas, or obtained by means of the viscerotome.

MEDITERRANEAN

PALESTINE (1934).

Palestine on the western edge of the continent of Asia at the eastern extremity of the Mediterranean Sea, is bounded by the Mediterranean on the west Syria on the north, Trans-Jordan on the east and the Egyptian Frontier District of Sinai on the south. It has a total area of about 10,100 sq. miles (somewhat larger than that of Wales). The chief town and seat of government is Jerusalem other important towns are Gaza, Tel Aviv, Acre, Jaffa and Haifa, the last two being also the chief ports. Palestine is administered under a Mandate from the League of Nations.

The establishment of the Department was increased by the following appointments Medical Officer Ophthalmic Clinic, Jaffa Medical Officer Haifa Port a British Nursing Sister for the Infectious Hospital Extension Jaffa an Infant Welfare Supervisor and an Assistant four Assistant Sanitary Inspectors for village duties an X-ray Attendant for Nablus Hospital three clerks three District Nurses four Staff Nurses two Ophthalmic Nurses four Assistant Dispensers one Quarantine Sub-Inspector for Haifa Port and a Driver for the Motor Ambulance Haifa.

Vital Statistics—This section of the Report is unusually complete. The estimated mid year population (exclusive of figures relating to Bedou tribes and given as 66,553) was returned as 1,104,605 (1,038,331), of whom 740,627 (704,624) were Moslem, 253,700 (209,207) Jews, 99,532 (95,165) Christians and 10,748 (10,532) defined as Others.

Registered births were 45,942 (46,069) and the birth rate 41.6 (44.4) per mille the crude birth rates of the different communities being Moslems 46.6 (49.8) Jews 30.2 (29.2) Christians 33.5 (36.0) and "Others" 41.8 (47.0).

Registered deaths numbered 24,136 (20,868) and the death rate 21.9 (20.1) per mille, the death rates by communities being—Moslems 29.7 (24.1) Jews 9.5 (9.3) Christians 16.3 (14.0) and "Others" 31.0 (17.8).

Of 8,758 deaths certified as to cause of death by medical practitioners 23 per cent were due to respiratory affections, 21 per cent. to diarrhoea and enteritis (mainly children under 2 years) and 11.5 per cent. to infection and parasitic diseases.

There were 7,243 (8,656) infant deaths, giving an infant mortality rate of 157.7 (144.5) per 1,000 live births. The I.M.R. for Christians, Moslems and Others shows an increase, that for the Jewish population a decrease the respective rates being Moslems 175.3 (156.8) Christians 152.6 (128.4) Others 202.7 (143.4) and Jews 77.0 (80.5).

Maternity and Child Welfare Work.—Admissions to the Princess Mary Maternity Wards at the Government Hospital were Moslems 236 Christians 240 Jews 22, a total of 548 (526). There were 522 (499) births and 4 (5) maternal deaths. At this Hospital is established the Midwives Training School, where, during the year under review six graduate nurses completed the course of training. The Pupil-Midwives Section of the Watan Hospital, Nablus, was completed during the year. The Jerusalem District Maternity Services attended 104 (99) births during the year and assisted practising midwives in 100 (98) cases.

There are now 52 Infant Welfare Centres established in various parts of the country, and of these 22 are maintained by Government and Municipal Authorities 21 by the Hadassah Medical Organization 5 by Local Committees and 4 by the Women's International Zionist Association. At these Centres 21,057 (19,577) infants were cared for during the year 287,596 (255,136) attendances recorded and over a hundred thousand (88,729) visits to infants in their homes were paid by Nurses. The four Superintendents of Midwifery and Child Welfare in the Jerusalem, Jaffa, Habsus and Haifa areas maintain a high standard of work at the centres under their control at the village clinics midwives with Infant Welfare training are employed. A gratifying feature of the work is seen in the regular attendance of the senior pupils at Girls Schools at the centres for practical training.

School Hygiene—The School Medical Service continued to function as formerly mainly for Government Schools but extended to non Government schools applying for its services. With very few exceptions Jewish schools are dealt with by the Hadassah Medical Organization, a subsidy from Government funds being made towards these services. A definite and gratifying improvement is recorded in general sanitary conditions but a few exceptions are noted where overcrowding occurs, or where temporary premises are scarcely suited to requirements.

At present there are 320 (299) Government Schools accommodating 23,925 (21,102) boys and 6,917 (5,459) girls 257 of the Schools being situated in villages non-Government Schools number 789 (717) with 40,783 (36,977) boys and 31,371 (28,275) girls on their registers. Medical examination of school children is carried out at regular intervals and instruction in the elements of hygiene forms part of the curriculum. During the year under review 16,843 (16,824) children were examined 53·6 (53·4) per cent. were found to be suffering from trachoma, 48·5 (50·0) per cent. in town schools 63·8 (60·0) per cent. in village schools. In the poorer schools verminous heads and bodies are much less frequently met with. Treatment afforded to the schools for eye conditions skin affections etc. has produced good results but there is still too little co-operation on the part of parents in the remedying of defects. Forty three lectures on hygiene by Medical Officers were attended by 260 teachers.

Public Health Sanitation etc—The year 1932-33 was a bad year for the rural population of Palestine. The year under review was infinitely worse—drought conditions prevailed from April onwards water supplies failed in many village areas and villagers and nomadic tribes were on the verge of starvation through crop-failures and death of their milk-producing stock. Relief measures and the distribution of subsistence rations on a large scale had to be undertaken. In spite of these adverse conditions the general mortality rate increased by only 1·8 per 1,000 and there is little doubt that the provision of milk at the Infant Welfare Centres had a material effect in reducing what otherwise would have been a much higher Infant Mortality Rate.

Work on water supply schemes was actively pushed forward. Improvements were carried out in 73 villages and rural areas increasing supplies to such an extent as to ensure that in future drought years the population will not lie at the risk of suffering such extreme hardships as were recently experienced. Great strides were also made towards

the improvement of town supplies, and in addition to numerous schemes of minor character the following important improvements may be noted. Work on the Jerusalem supply from Ras el Ain approached completion. Successful borings were carried out in the neighbourhood of Haifa town where present supplies are inadequate. The supplies of doubtful purity serving Tel-Aviv are to be replaced by supplies from safer sources. Work was well advanced on the supply for Hebron town from additional sources at Am Fawar. The new system for Nablus was completed and has functioned satisfactorily. A new source is being developed for Nazareth, the Gaza supply has been improved by the construction of a new high level reservoir and a new service reservoir was completed for Ramleh. No great progress is reported with Jaffa's requirements, where perhaps the provision of clean water supplies is most desirable. The Municipality have under consideration a scheme which they hope to implement.

With regard to *sewerage and drainage work*, the main sewer scheme for Jerusalem approaches completion, and good progress is recorded with Salameh Road sewer in the Jaffa-Tel-Aviv Area, a joint undertaking of the two Municipalities. Work on the preparation of a main drainage scheme for Haifa proceeds while an outline scheme for similar works on Tel-Aviv is under consideration.

The campaign for the establishment of *village latrines* was successfully carried through and 6,122 latrines have been installed in 43 villages. In the construction of some of these, old road tar barrels were used, placed end to end, surrounded with rubble and provided with a concrete top.

Sewerage services in the large and rapidly growing towns were severely taxed to keep pace with increasing demands, and in some cases where adequate provision for expansion of this service had been overlooked standards of efficiency declined. Refuse disposal in both Jaffa and in Tel Aviv is reported as unsatisfactory. In Haifa a new refuse disposal plant and a new slaughter house are to be erected, in Tel-Aviv construction of a modern destruction plant is to be undertaken and in Jerusalem extension to the new slaughter house and destruction plant are to be carried out.

Housing and Town Planning—Great activity in building development is reported in the larger towns—Haifa, Tel-Aviv, Jerusalem, etc., places chiefly affected by increased immigration, yet there is still serious overcrowding in certain areas. Insanitary and overcrowded premises in the poorer quarters of the principal towns and villages, and the unrestricted development of squalid hutment areas in some districts, are still met with. The Central Town Planning Commission finally approved of 77 town-planning schemes in different town areas, the schemes showed marked improvement in standards of internal and external construction, drainage and sanitation.

There was a considerable increase in the number of establishments producing or offering for sale foods and drinks and licensable under the Trades and Industries Ordinance. The milk trade remains unsatisfactory though developed in certain cases under a co-operative system—rural cowsheds are badly maintained, and pails and churns improperly sterilized. The Public Health (Rules as to Food) Ordinance empowers the Director of Medical Services to prescribe standards of quality for articles of food exposed for sale.

Port Health Work etc—Quarantine restrictions on account of cholera were enforced against arrivals from Bombay from 29th August to 20th October. The new quarantine offices at Haifa were taken over in March, and the new port disinfecting station in December—the quarantine lazaret at Haifa was improved and constructional work on the extension commenced. The usual rat-catching operations were carried out. 631 (606) rats were examined none was found plague infected. Average number of fleas per rat was 5.2 *X. cheopis* accounting for 96 per cent. of the total captured. Palestine and Trans Jordan pilgrims proceeding to Mecca did so as formerly under arrangements made by the Department.

There was a considerable increase in air traffic 427 planes landing at Gaza, and 96 at Lydda. Recommendations regarding equipment staff, etc., for Lydda have been submitted with a view to its classification as a Sanitary Aerodrome for the sanitary supervision of aerial traffic.

Of the Railway Medical Service it is reported that repairs to the Kantara water distribution system were completed that during the year water cisterns were built at main stations on the Sinai Railway and that the programme is being extended to all stations. A good deal of building activity is recorded but the need for suitable houses for workmen in the neighbourhood of the new Qunshon workshops is urgent. Attendances at clinics of Medical Officers totalled 12,377 (9,553) and there were 7,731 (3,811) new cases the increase being partly attributable to increased railway personnel.

Hospitals Dispensaries Clinical Returns etc—The hospitals Government, Municipal and Voluntary are as described in the last issue of this Supplement (see this *Bulletin* 1935 Supp pp. 100*-1*) but improvements and additions were carried out to many of them during the year among the principal being. The addition of a third storey accommodating 51 beds to the Municipal Hospital, Tel Aviv various additions to the Safed Hospital and to the Scottish Mission Hospital at Tibertiahs the Kupat Cholim (Workman's Health Insurance Society) commenced construction of a 50-75 bed-hospital at Petach Tikkah, and completed certain additions to the Emek Hospital they maintain a new Isolation Section to the Watan Hospital, Nablus was completed and the quarantine lazaret at Jaffa converted to an Isolation Hospital. During 1934 beds available in Government and Municipal Hospitals totalled 663 (563) and in Voluntary Hospitals (including Special Hospitals and Convalescent Homes) 1,665 (1,629).

Admissions to Government and Municipal Hospitals numbered 15,117 (12,689) and of these 6,880 (5,566) were Moslems 2,001 (1,755) Christians 6,216 (5,351) Jews and 20 other religions. At Government Dispensaries and Clinics (exclusive of Ophthalmic and other special clinics) 385,563 (357,736) attendances and 139,902 (117,109) new cases were recorded, the latter comprising Moslems 105,331 Jews 20,376 Christians and Others 14,195.

Admissions to voluntary hospitals totalled 28,714 (25,418) comprising Jews 13,242 (12,131) Moslems 8,735 (7,412) Christians 4,335 and Others 2,402. At the Voluntary Dispensaries and Clinics 301,613 (411,077) new patients were treated, and 1,468,441 (1,190,114) attendances recorded. Here Jewish cases are in the majority with 332,025 followed by Moslems 121,329 and Christians and Others 48,257.

The two Mental Hospitals were full to capacity throughout the year structural alterations providing for 30 additional patients were decided upon, and work on a new Government Mental Hospital of 240 beds was about to commence.

The Ophthalmic Service established six additional clinics during the year so there would now appear to be 24 centres functioning in various parts of the country. During the year 66,842 new patients were treated and 654,469 attendances recorded the classification of conditions treated includes trachoma 53,256 cases acute conjunctivitis 31,088 patients blind in one or both eyes numbered 3,545.

During the year under review there was an increased incidence of infectious and communicable disease 19,120 cases with 1,614 deaths being recorded, as compared with 12,947 cases and 1,393 deaths in 1933. The following comments relate to disease experience in general —

Malaria — The increase in the incidence of malaria noted in 1933 was more definite during 1934 affecting mainly the coastal plain between Haifa and Jaffa the shores of Lake Tiberias, and certain villages of Hebron district and Beersheba Bedouins. In the towns where medical supervision is complete and where antimalarial services were adequately maintained the incidence was negligible. According to official returns 3,011 cases were reported (an increase of approximately 2,000 over the 1933 figures) and 30 (11) deaths were recorded 5,318 (3,300) patients, or 0.83 (0.63) per cent. of total dispensary patients, were treated for malaria. Figures of cases are apt to be misleading for many undiagnosed fevers are recorded as malaria. Increase in the number of cases is partly attributed to the fact that successful results of treatment with Atabrin have encouraged Bedouins and Fellahs to present themselves in larger numbers for treatment.

Among 22,698 (19,933) town school children medically examined the spleen rate averaged 1.64 (1.32) and among 41,587 (49,853) village children 5.5 (4.3). The combined rates for each of the four administrative districts were Jerusalem 0.8 (0.6) Jaffa 0.4 (0.1) Haifa 4.7 (2.4) Samaria and Galilee 11.7 (12.8).

Two fatal cases of blackwater fever were reported, both children aged 4 years.

Considerable anti-malarial work was undertaken during the year. The lowering of the level of Lake Tiberias exposed innumerable springs and seepage areas along the shores providing ideal breeding conditions for *A. sargentii* and additional work was necessary in the Hadi-Hawarith Birket Ramadan area around new Jewish colonies established in marshy and highly malarious situations. There were 126 water streams and springheads under anti-malarial control throughout the country and 19 marsh drainage schemes providing nearly 300 miles of canalization requiring supervision and maintenance during the year.

Blood films examined at the Laboratory totalled 10,296 (5,531) and of those positive for malaria parasites 947 or 86.3 (63.0) per cent. were *P. vivax* 468 or 32.8 (36.4) per cent. *P. falciparum* and 14 or 0.9 (0.4) per cent. *P. malariae*.

Numerically enteric fever was more prevalent with 2,009 (1,069) cases and 185 (107) deaths, plus 323 (259) paratyphoid cases with 17 (7) deaths. Causes contributing to this more unfavourable experience may have been (a) the large increase in the population of susceptible foreigners, and (b) the migration of Arabs to towns in search of work where

they live under indescribably filthy conditions. Infected they return to their villages where they form a focus of infection for their families and neighbours it has been observed that each year outbreaks of the disease are becoming more common in Arab villages

The principal centres affected were Haifa 607 (204) cases Jerusalem 376 (140) Jaffa and environs 561 (384) and Nablus 202 (64)

Among 23,308 (15,140) sera examined at the Laboratory for agglutinins, 1,084 or 68.2 (74.7) per cent reacted positively with *Bact. typhosum* 63 or 4.0 (2.1) per cent. with *Bact. paratyphosum A* 419 or 26.4 (20.7) per cent. with *Bact. paratyphosum B* and 23 or 1.4 (1.8) per cent. with *Bact. paratyphosum C*. A tendency was noted on the part of the O form of *Bact. typhosum* antigen used in qualitative tests to become self-agglutinating.

Reported cases of dysentery were 491 compared with 414 in 1933 and 46 (30) deaths were recorded. Of the 491 cases 303 were bacillary, 174 amoebic and 14 were unclassified. Attention is called to the fact that in addition to dysentery deaths 1,868 deaths were certified in towns alone as due to diarrhoea and enteritis as against 1,491 in the previous year.

Diphtheria was more prevalent 442 (210) cases with 36 (21) deaths being reported and here again the incidence was practically confined to the chief towns, Jaffa heading the list with 251 cases. Of measles 6,002 (4,998) cases were notified but deaths were fewer 301 (372) a case fatality of 5 per cent. Scarlet fever was less prevalent with 168 (383) cases and one death.

Three separate occurrences of smallpox were noted. Infection was introduced to a village in Beisan Sub-District in February and a total of 20 cases with 2 deaths resulted before the outbreak was brought to an end. In June a tribal group of Bedouin in the Beersheba District became infected seven cases occurred four terminating fatally. Finally in December a case imported from Damascus appeared in Haifa, but no further cases were reported in the town. During the year 43,871 primary vaccinations (95 per cent. of which were successful) and 129,844 re-vaccinations were performed.

There was a higher incidence of the epidemic diseases of the central nervous system. Of acute poliomyelitis 17 (9) cases with 4 (3) deaths were notified, while *encephalitis lethargica* reappeared and was responsible for 4 (0) cases with 3 (0) deaths. The most significant and serious increase was however in respect to cerebrospinal meningitis of which 120 (4) cases and 51 (2) deaths were reported the highest previously recorded level being in 1922 when 23 cases with 19 deaths occurred. Overcrowding and squalid conditions particularly in Jaffa and in Haifa, provide an ideal environment for this disease—63 cases occurred in Jaffa and neighbourhood 18 in Haifa and 30 in Jerusalem.

Tuberculosis cases increased from 412 with 258 deaths in 1933 to 2,540 with 324 deaths during the year under review. No doubt the increases result from the tuberculosis survey now in operation. To date some 3,600 cases (all forms) have been registered, of which 23 per cent. are pulmonary. Jewish cases number 1,000 and Arab 2,600 though the latter figure will show considerable increase by the time the survey is completed. From available information it is clear tuberculosis is a serious cause of morbidity and mortality. Certain preliminary proposals concerned with prevention and treatment have been submitted

and when adopted will serve to deal with the problem until a complete tuberculous service can be established.

Rabies—There are now 31 centres throughout the country where anti-rabic treatment may be obtained with carbolized vaccine prepared and issued by the Central Laboratory. During the year 1,589 (1,572) persons applied for advice regarding their wounding and of these 1,521 (1,323) were treated. 1,029 cases received the full course, 482 cases being discontinued after observation had shown that the biting animals were healthy at the time of biting. There were 5 (3) deaths due to hydrophobia the period of incubation in these cases ranging between 25 and 69 days. There were recorded 127 (112) cases of rabies among animals 75·6 per cent of them were dogs. During the year 13,399 dogs, 2,801 cats and 718 wild animals were destroyed under the anti-rabies measures in force. The newly enacted Rabies Ordinance of 1934 provides adequate measures for the prevention and control of the disease.

Helminthiasis—The *ankylostomiasis* survey previously confined to the citrus belt in the Jaffa District (see this Bulletin 1933 Supp. p. 103*) was extended to the Ramle-Lydda area in the Southern District to the Habri area in the North, and to a limited extent in the Beisan Sub-District the rates of infestation in the first two of these three areas being 3 per cent and 10 per cent respectively as compared with 50-70 per cent in the surveyed Jaffa area. The investigation is to be extended to other districts, and a re-survey of the Jaffa area will ascertain what have been the effects of sanitation and treatment. Official returns record 42 cases of *ankylostomiasis* with 2 deaths. At the Central Laboratory out of 3,132 faecal specimens positive for worm or a the numerically most important were *Acaris hominivora*, *Ankylostoma duodenale* and *Trichuris trichiura*, representing 30·25·8 and 25·6 per cent respectively of positive helminthic findings, other findings being *Hymenolepis nana* 7·7 per cent and *Taenia saginata* 6·7 per cent. Other diseases noted were *syphilis* 572 cases and 12 deaths, *whooping cough* 843 (875) cases with 12 (29) deaths, *influenza* 432 (164) cases, 24 (15) deaths, *typhus fever* 28 (29) cases, none (1) fatal, *relapsing fever* 15 (23) cases, *puerperal fever* 41 (47) cases, 18 (22) deaths, *anthrax* 33 (39) cases, 3 (9) deaths, and *cladus* 64 (47) cases and 28 (29) deaths.

Scientific—Some branches of the work of the Central Laboratory have already been the subject of brief mention in the course of this summary and it remains to add a short account of the nature and scope of laboratory activities in general during the year under review.

In addition to the preparation of large supplies of calf lymph, of carbolized anti-rabic vaccine and of anti-enteric vaccines, the Bacteriological Division also dealt with the routine examination of over 200,000 (160,884) specimens for diagnostic purposes. The most important of these included 10,296 (5,531) blood films—already referred to under the heading *Malaria*—and 5,745 (3,525) blood cultures. The agglutinin content of 23,308 (15,140) sera was investigated and 5,782 (4,399) Wassermann reactions carried out. Naso-pharyngeal swabs numbered 11,000 (5,548) *C. diphtheriae* being detected in 1,258 cases. 17,058 (18,333) faecal specimens were subjected to microscopic examination (see under *Helminthiasis*) and 11,954 (8,096) to cultural

examination. Other investigations included the examination of all imported vaccines and imported sera medico-legal work the examination of rats for plague of milk and water and so on

Yet despite the volume of routine work research was not neglected. The nature and degree of agglutinin response to various enterica antigens were further investigated and the main findings published. Research into the structure of renal calculi was undertaken an attempt was made to determine the types of mycobacterium responsible for human and bovine tuberculosis in Palestine while the study of the virulence and cultural characteristics of *C. diphtheriae* formed another subject of enquiry.

In the Chemical Division 10,933 (9,965) samples of all kinds were dealt with these included 3,800 (3,702) milk samples examined in twelve provincial centres, 2,229 samples of edible oils and fats and a large number of analytical investigations for various Government Departments. Research work included an investigation of the factors influencing the acidity of local olive oil the salinity of irrigation water in the interests of citrus growers and a new series of experiments concerned with the corrosion of aluminium alloys by Palestine water.

Work in the Entomological Division is still restricted to the identification and classification of insects and the testing of various insecticides (see this *Bulletin* 1935 Supp p 105*)

Financial—Total expenditure of the Department amounted to £P 161,600 (£P 137,154) a sum which represents 4·6 (4·7) per cent of the estimated revenue of the Palestine Government.

EMIRATE OF TRANS-JORDAN (1934)

Trans-Jordan, which is administered under the same Mandate as Palestine is a strip of country bounded on the west by Palestine on the north by Syria, on the east by Iraq and on the south by Saudi Arabia, with access to the Red Sea at Akaba. Its area is unknown as the boundaries are not definitely determined Amman, the capital, is on the Hedjaz railway.

Vital Statistics—No proper census of the population has been taken and the population figure based on rough estimates remains the same, viz. 300,000. Births totalled 10,742 (10,900) and the birth rate 35·8 (36·8) per 1,000 and deaths 7,925 (7,354) giving a death rate of 26·4 (24·6) per 1,000. Infant deaths numbered 2,601 (2,404) the infant mortality rate being 242 (220·6) per 1,000 births—the I.M.R. for towns and for villages and bedouin tribes being returned as 188 (205·6) and 258 (224·8) respectively. It is observed that deaths are more readily notified than births and female births than male births.

Maternity and Child Welfare Work—Nine (8) cases of puerperal fever with 2 (3) deaths were reported during the year. Owing to shortage of staff the C.I.S. Infant Welfare Centre at Es-Salt was closed down but the centre at Amman continued to function as formerly a Medical Officer of Health now being in charge of the clinic. New cases totalled 148 (146) recorded attendances 11,831 (10,197) and home visits by nurses 2,485 (1,972).

School Medical Services—The Department of Health continued the public health control of all Government and voluntary schools in the

territory, these totalled 185 (183) with 8,711 (8,423) boys and 2,536 (2,338) girls on their registers. During the year 6,862 (4,010) school children were medically examined when 1,548 or 22.5 (19.8) per cent. were found to be suffering from trachoma, and 243 or 3.5 (2.6) per cent. showed enlarged spleens the spleen rates ranging from 1.7 in Amman Town and Irbid Town to 5.9 in Ajloun Town. At the school Ophthalmic Clinic attendances were 232,917 (232,364).

General Hygiene and Sanitation — Rainfall was below the average, and owing to serious shortage of water supplies many villagers and bedouin were driven to the use of impure water for drinking purposes, with harmful results. The water supply schemes for Irbid Town (see this Bulletin 1933 Supp. p 106*) and Zerqa village were brought into use during the year. Constructional work has increased the volume and made the supply safe at Beineira village in Tafilah Sub-District.

Government has now entrusted all scavenging services in Municipal areas to the Medical Officers of Health, and has also approved the granting of a loan to assist Es-Salt Municipality to proceed to the construction of drains in the town. The routine inspection of villages and bedouin camps was continued by Medical Officers and Sanitary Inspectors who seek to bring about gradual improvement in the sanitary conditions in such areas.

General health of the men of the Arab Legion was satisfactory men at outposts in malarial regions lie at the risk of infection, for their duties frequently involve night travel. Total cases admitted to Government Hospitals, etc. 117 (123) and to Voluntary Hospitals 18 (16) four (0) deaths were recorded. The medical care of the men of this force is a responsibility of the Government Department of Health, no special medical staff being attached to the Arab Legion. With regard to Prisons Medical Officers of Health continued routine inspections as in former years. The general health of prisoners was good. Hospital admissions numbered 104 (104) with 4 (3) deaths, and attendances at Government Clinics totalled 7,471 (9,298).

Quarantine — During the year 404 pilgrims proceeded via the Southern Frontier to the Hedjas and 356 returned by the same route all were subjected to routine quarantine measures at the frontier and to medical surveillance on entry to Trans Jordan. No case of dangerous quarantinable disease was reported.

Hospitals Dispensaries Clinical Returns etc — Following Government approval preparations for the establishment of a small hospital at Irbid have been made another scheme designed to provide for a new hospital at Amman is under consideration.

Patients admitted to the Government Hospital, Amman, and to District Detention posts numbered 563 (545) and hospital deaths were 58 (34). Attendances for treatment at Public Health Department Dispensaries totalled 154,545 (132,160) the largest number of attendances being reported from the Amman Clinic with 83,501 (71,145). New cases seen at Dispensaries numbered 33,990 (36,251) and of these 8,737 (10,733) were treated for eye afflictions, 1,536 (1,433) for malaria, and 23,690 (24,115) for other diseases.

With regard to Voluntary Hospitals the C.M.S. hospital at Es-Salt, after being closed for lack of funds was re-opened in April 1934, but with bed accommodation for 10 instead of 30. The new Italian

National Association hospital approaches completion. Total admissions to Voluntary hospitals were 1,081 ((1,218) distributed as follows—C.I.S. hospital 381 (507), English Hospital, Amman 68 (93), Italian Hospital 587 (505) and the Irak Petroleum Co's hospital 45 (113). Attendances at Voluntary Clinics totalled 25,331 (21,143), eye diseases accounting for 1,851 (957) new cases and malaria for 1,175 (443).

The epidemic posts previously described (see this *Bulletin* 1935 Supp., p. 107*) continued to function as formerly. 184 (168) cases being admitted during the year—the mobile epidemic equipment was frequently used among the bedouin tribes.

Notifications of *Infectious and Communicable Diseases* totalled 3,100 (3,061) and 294 (400) deaths were registered. Principal diseases commented upon in the Report included—

Malaria.—The migration of large numbers of people from areas affected by extreme water shortage to the Jordan Valley and other malarial regions was largely responsible for an increase in the incidence of malaria during the year 2,376 (1,876) new cases being reported. At the Government Laboratory 1,754 (1,808) blood specimens were examined for malaria parasites 942 (607) proving positive and of these 696 or 73.9 (79.7) per cent. were benign tertian 184 or 19.5 (14.3) per cent. subtertian, and 61 or 6.5 (5.9) per cent. mixed infections. In addition to the medical examination of school children already mentioned under *School Medical Services* 9,199 other children were medically examined in different parts of the country with the object of determining spleen indices 417 were found with enlarged spleens a spleen rate of 4.5 (3.7) per cent.

The Department continued routine anti-malaria work along the lines adopted in previous years in areas sparsely populated much remains to be done.

Tuberculosis.—This disease was responsible for 415 (360) cases and 60 (59) deaths. 246 of the total cases appear tabulated under Amman District, but this does not necessarily indicate the incidence of the disease among residents in the district. Amman Town is the principal medical centre in Trans-Jordan and ailing natives from other areas attend for treatment for tuberculosis and other affections.

Dr N. M. MACLENNAN Senior Medical Officer of Health, Palestine carried out a survey of health conditions of four nomadic and semi-nomadic tribes in Trans-Jordan, the total number of persons examined being 1,030. Although the numbers examined represent only a small percentage of the total population yet 173 persons were found to be suffering from Tuberculosis (all forms) and not less than 135 of these suffered from the pulmonary form of the disease, a particularly high incidence.

Exanthemic fever 146 (158) cases with 9 (14) deaths. *Bacillus typhosum* numbering 120 (132) with 7 (14) deaths and *Bacillus paratyphosum* infections 35 (26) with 2 (0) deaths. Cases of dysentery numbered 221 (273) and 5 (4) deaths were ascribed to this cause. Type of infection appears to have been defined in five cases only of which 2 were amoebic and 3 bacillary. Smallpox was prevalent in adjacent countries but only 4 (9) cases, all imported, were reported in Trans-Jordan and no death was recorded. 32,947 (79,011) vaccinations and re-vaccinations were performed.

Diphtheria was responsible for 9 (2) cases with one (one) death, scarlet fever 2 (1) non fatal cases, measles 719 (2,010) cases and 77 (159) deaths—Irbid and Ajloun being the principal areas affected. Influenza was less prevalent, only 748 (1,096) cases being reported but mortality was higher 77 deaths being recorded as compared with 41 in 1933. Fewer cases of mumps and chickenpox were notified, 28 (211) of the former and 42 (78) of the latter and no death ascribed to either cause.

There were 60 (68) cases of typhus fever with 6 (7) deaths, all the cases occurring between February and July and attributed to the immigration of tribes from the east during that period. The source of infection in common with previous experience was Nejd (Arabia) the majority of the cases occurring among bedouin tribes camping in the districts of Kerak, Tafleah, Madaba, Amman, Jerash and Irbid. All cases were isolated and contacts kept in quarantine for twelve days from the date of completion of delousing. Cerebrospinal meningitis gave rise to 23 cases with 13 deaths, all cases but one being reported from Amman Town. Delay in reporting for treatment combined with virulence of the disease were factors contributing to high case-fatality. Erysipelas cases numbered 47 (23) and 2 (3) deaths were recorded, while 7 (10) cases with one (0) death of anthrax were reported.

No case of rabies was reported but twelve persons bitten by animals suspected of rabies were treated with prophylactic vaccine prepared at the Central Laboratories of the Department of Health.

Scientific—The staff of the Laboratory remains unchanged (see this Bulletin 1933 Supp. p. 109*) The proposal that a permanent cleaner should be appointed appears to be ignored, and in view of the increasing demand the accommodation in the Laboratory is rapidly becoming inadequate. The number of specimens examined again shows an increase with 5,491 compared with 4,325 in the preceding year. Blood films examined for malaria parasites have already been mentioned other examinations including 562 sera for agglutination of members of the enteric and protozoan groups, 214 Kahn tests, and 394 faecal specimens. In addition to the above Medical Officers of Health carried out 3,639 (3,347) medico-legal examinations, 98 of the total being post mortem examinations.

Financial—Estimated expenditure on the Department is given as £P13,365 (£P12,806) or 3·4 (3·4) per cent. of the total Government revenue for the year under review. Increased expenditure was due to the cost of salaries attaching to three new posts increased new grant to the C.M.S. hospital at Es-Salt extra cost of anti-malarial work, etc., but in spite of these additional burdens, the proportion of Medical Department expenditure to total Government revenue is the lowest observed of any British Colony, Protectorate or Mandated Territory.

CYPRUS (1934)

Cyprus, an island in the eastern Mediterranean, lies some 40 miles south of Asia Minor, 60 miles west of Syria and 240 miles north of Egypt. Its area is 3,584 square miles (about that of Norfolk and Suffolk combined). Nicosia, its capital, lies near the centre of the island.

Vital Statistics—Estimated population figures are given for (a) the Colony as a whole, (b) for each of the six Districts, and (c) for each of

the six principal towns. Absolute numbers of registered *births* *deaths* etc. are not given *rates only* appear in the Report. Population and other data are as follows —

	Population	Birth rate	Death rate	Infant mortality rate
(a) The Colony	359 778 (356,059)	30.1 (27.4)	13.2 (13.8)	128.0 (137.7)
(b) Districts				
Nicosia	115,165 (113,543)	28.5 (25.4)	12.4 (13.2)	111.4 (118.5)
Larnaca	44,521 (43,783)	26.8 (24.7)	12.5 (12.4)	123.9 (115.5)
Limassol ..	58,954 (58,604)	30.8 (27.8)	14.1 (16.8)	134.6 (186.5)
Famagusta ..	73,922 (73,151)	31.6 (30.9)	12.9 (11.4)	139.3 (117.3)
Paphos	44,226 (44,082)	34.2 (29.7)	14.8 (15.8)	144.0 (160.8)
Kyrenia	22,890 (22,896)	30.4 (23.2)	13.7 (14.7)	136.9 (136.6)
(c) Principal Towns				
Nicosia	25,294 (24,785)	25.2 (21.2)	13.9 (15.0)	62.6 (77.7)
Larnaca	12,340 (12,330)	21.4 (21.1)	13.6 (14.6)	137.5 (130.2)
Limassol	15,998 (15,794)	29.3 (24.2)	15.5 (15.7)	136.5 (114.8)
Famagusta	10,931 (10,631)	22.3 (18.8)	12.0 (9.2)	163.0 (154.2)
Paphos	4,644 (4,604)	17.4 (14.1)	11.4 (11.8)	88.4 (138.4)
Kyrenia	2,210 (2,187)	33.9 (22.4)	10.8 (11.4)	80.0 (102.0)

European Officials resident numbered 102 (101) the average number resident being 86.6 (89.7). None (1) were invalidated but 2 (0) deaths occurred the causes of these deaths are not stated. As regards *Cypriots Officials* 2,025 (1,959) were resident with an average number resident of 2,016 (1,953) 21 (4) were invalidated and 5 (5) died. Causes of invalidings and deaths are not stated.

Maternity and Child Welfare — Twenty four (22) students attended the classes for the training of midwives and 17 (17) successfully passed the local examination in addition 27 (20) pupils commenced their training and 25 (16) received the Government Certificate of Competency. During the year also 19 midwives holding Diplomas of recognised schools and 93 trained in Cyprus were registered under the Midwifery Law of 1932.

Government midwives and their pupils attended 226 (332) confinements during the year. 226 (203) labours are stated to have taken place in the Nicosia Maternity Wards with 5 maternal deaths, and 247 maternity cases to have received attention at the remaining 5 district hospitals. Hospital returns appear to show a total of 480 cases with 7 maternal deaths.

The Medical Department in co-operation with the Nicosia Child Welfare Association again organized a successful Baby Show and Health Exhibition. All children up to three years of age born in the Nicosia District were eligible, but higher prizes were awarded to those who had attended the Child Welfare Centre. In addition to exhibits designed to spread general knowledge of hygiene and sanitation special sections were devoted to Child Welfare and included Care of the Baby "Diet" etc. A handbook providing useful information and suggestions on Child Welfare and Hygiene was published on this occasion by the Organising Committee.

School Hygiene—Although it is still possible to find schools without latrines or where these are provided to find them neglected, there is noted a marked improvement in the general conditions of the schools in the Island, the school teachers now being held responsible for maintaining school premises in a sanitary condition.

There is no service which can be defined as a School Medical Service, though the Department employs a Medical Officer for schools in the Paphos District. 2,023 (2,191) pupils were examined in 58 (68) schools, the principal defects noted being dental 17.9 (19.8) per cent., throat and nose affections 16.8 (11.3) per cent., enlarged spleens 13.8 (19.9) per cent. eye troubles 10.1 (18.3).

General Hygiene Sanitation etc.—The increased interest in Public Health matters taken by the Municipal Authorities is already showing good results—co-operation efforts are now devoted to the removal or correction of obvious elements detrimental to the health of the community. Better work could be accomplished if the present part-time Medical Officers employed in Municipal areas could be replaced by whole-time Medical Officers of Health. The six principal Municipalities now have trained Sanitary Inspectors in their service, in addition to the corps of temporary sanitary labourers employed by them. 13 (8) pupils attended the Sanitary Inspectors School, during the year 4 (2) obtained the Certificate of the Royal Sanitary Institute, and 7 (8) passed the Local Examinations.

To spread the knowledge of hygiene and sanitation, 147 (77) public lectures were held at 20 (37) centres, and an aggregate attendance of 33,368 (30,000) was recorded. Malaria, typhoid, tuberculosis, dirt, venereal diseases, infant care, general hygiene, teeth, diseases of animals in relation to man etc. were subjects discussed on these occasions. There is general appreciation of these talks, and many applications were received by the Department from villages for health lectures, those appeals being responded to whenever possible.

Sewage Disposal continues a problem (see this Bulletin 1933 Supp. p. 110) for on account of water shortage, no town or village possesses any proper system. By means of lectures and demonstrations, efforts are made to educate the people and emphasize the importance of efficient disposal of sewage.

As regards water supplies the year marked a break in the long continued drought, for though the rainfall was not abundant, it proved sufficient to replenish the depleted underground supplies and sources that had completely dried up. Efforts in the search for new supplies were unabated during the year resulting in the notable success of the finding of a new spring at Sykhari in the limestone formations of the Kyrenia Mountains, at a point opposite to Nicosia. The analysis of this supply showed it to be of a satisfactory quality. The Report of the Government Analyst summarizes the analysis of 14 different sources included in the scheme for the Water Survey of Cyprus. From the results of the Departmental Water Survey, it has been possible to tabulate the areas in which searches for supplies of good water appear to offer the most promising prospects of success (see also this Bulletin, 1933 Supp. pp. 110*-111*).

As a result of attention given to housing matters, there appears a general tendency to construct better houses except in areas outside the control of the Building Committee. The sanitary arrangements of

houses in the villages are however of the most primitive kind buildings are congested and lack adequate light and ventilation. The sanitary arrangements of industrial concerns are also far from satisfactory and a Law to regulate such arrangements in all industries and public establishments is suggested.

The usual anti-malarial measures were carried out upwards of 1 500 miles of river beds, drains streams etc. were dealt with and new drains made and over 74 000 wells were covered filled oiled etc. or stocked with fish. The drainage of the marshy area near Athienou (see this Bulletin 1933 Supp. p 117*) has already resulted in a marked improvement in the health of the population of that village little malaria has been reported the mosquito nuisance has disappeared and the spleen rate of school children has declined from 27.7 per cent. in 1931 to 3.7 per cent. in 1934 It is proposed to extend the drainage scheme to other areas.

Hospitals Dispensaries Clinical etc—There are Government Hospitals at Nicosia and Limassol, and State-aided hospitals at Larnaca Famagusta, Paphos and Kyrenia exclusive of the Leper Farm Hospital the Sanatorium, and the Mental Hospital. A new departure was the establishment of four village hospitals which are maintained by voluntary contributions and financial assistance by the Government it is hoped to extend the scheme of village hospitals.

At the two Government and four State-aided hospitals in patients are stated to have numbered 5,220 (4,878) Hospital returns indicate that admissions during the year totalled 5,210 cases treated 5,394 (5,089) and out patients 113,110 At the six District Dispensaries attached to each of the above hospitals, and 23 Rural Dispensaries scattered about the Island, 80,433 new cases were treated during the year.

Malaria—Owing to drought conditions during 1932 and 1933 the incidence of malaria is still low and the spleen rates for districts and principal towns show a decrease also 11,665 (10,145) cases were reported, malaria cases forming 9.8 per cent. of total cases of in patients and out-patients during 1934 Of the 9,423 (10,190) persons examined in the six principal towns 77 (105) or 0.8 (1.0) per cent. had enlarged spleens and of 45,813 (50,333) examined in the districts between October and November 3,098 (3,843) or 6.7 (7.6) per cent. showed similar splenic enlargement. The Hospital returns indicate that out of 262 (219) in-patient cases 240 (191) were benign tertian and 13 (21) subtertian infections, while among 11,403 (9,926) out patients 9,809 (8,328) were benign tertian, 700 (621) quartan and 509 (425) subtertian infections. The Government Bacteriologist reports that 375 blood films were examined, and that 23 contained *P. falciparum* 10 *P. vivax* and 2 *P. malariae* The figures are no indication of the prevalence of the different parasites in Cyprus.

Reported cases of *exanthemic fever* were fewer 411 as against 528 in 1933 With the exception of an explosive epidemic in a village in the Larnaca District, where a temporary hospital had to be established, all cases were of a sporadic nature. Outbreaks usually follow the autumn rains, and are generally traced to village water supplies polluted through the indiscriminate use of the open yard as a latrine and the absence of proper refuse disposal arrangements The distribution of reported cases by Districts was Larnaca 3.9 (1.9) Limassol 1.2 (0.7)

(3.8) Nicosia 0.7 (1.0) Paphos 0.7 (0.8) Famagusta 0.5 (0.5) and Kyrenia 0.4 (1.1) per cent. 10 (3) cases of *Bact. paratyphosum A* infection were reported from the following Districts Nicosia 3 (1) Larnaca 1 (3) Limassol 3 (0) Famagusta 2 (0) and Paphos 1 (0) and 5 (6) of *Bact. paratyphosum B* viz. Nicosia 3 (2) Larnaca 1 (4) Kyrenia 1 (0). Of the 92 (103) hospital in-patients treated 90 (103) were typhoid cases 1 (1) paratyphoid A and 1 (2) paratyphoid B. 13 (12) hospital deaths were ascribed to this cause. There were also 165 (250) out-patients treated viz. 160 (255) typhoid, 1 (2) paratyphoid A, 2 (1) paratyphoid B and in 2 (2) cases the type was not defined. Of 402 (352) agglutination tests carried out by the Government Bacteriologist, 178 (166) gave positive results, *Bact. typhosum* 142 (160) *Bact. paratyphosum A* 18 (5) and *Bact. paratyphosum B* 18 (1).

There were 377 (312) cases of dysentery notified during the year. Outbreaks occurred in two villages, but energetic measures served to stamp them out. May and June were the months of highest prevalence and Limassol and Famagusta the Districts recording the highest incidence of cases. Hospital in-patients numbered 15 (20) of which 10 (12) were bacillary and 2 (7) amoebic among 293 (232) out-patient cases, 86 (69) were not defined, 189 (151) were bacillary and 18 (12) amoebic dysenteries.

The number of reported cases of pulmonary tuberculosis 233 (279) does not accurately represent the true incidence of the disease in the Island a Tuberculosis Survey would supply useful information. Sufferers seek admission to the Sanatorium but accommodation is inadequate to meet needs it is hoped that another Sanatorium with at least 50 beds will be established in the near future. 90 (74) cases received treatment in the Sanatorium and 23 (30) died. In the Hospital Returns it is observed 105 (97) in-patients were treated, there were 25 (37) deaths and 170 (175) cases attended for out patient treatment. The incidence of the disease is said to be 6.4 (7.7) per 10 000 population and among the six districts Limassol 8.8 (12.1) Paphos 8.5 (10.8) Famagusta 7.5 (7.6) Kyrenia 7.3 (3.8) Larnaca 6.9 (5.9) and Nicosia 3.3 (5.7).

Cancer cases treated as hospital in-patients numbered 152 (139), with 7 (4) deaths, and out-patients 137 (125). In a Special Report attached as an Appendix to the Annual Report the Surgical Specialist, Dr C H CURR among other matters discusses at length cancer cases and their treatment and supplies a wide range of interesting and valuable data. He observes that 1934 saw the completion of the first five years of radium therapy for cancer in Cyprus, and that a report will be prepared dealing with this subject. Having regard to the fact that the majority of cases of malignant disease presenting themselves for treatment in the Colony are radio-sensitive and usually beyond the scope of ordinary surgery radium is the only reasonable means of treatment. Furthermore, radium treatment in combination with deep X-ray therapy is particularly desirable in the treatment of carcinoma of the uterus.

As regards venereal diseases, syphilis is said to be decreasing but the situation in so far as gonococcal infections are concerned remains unchanged. At the five clinics attendances for treatment totalled 254 180 (253 180) new cases numbering 3,378 (3,755) plus 66 in the

prisons. The sex distribution of new cases was 2,352 (2,402) males and 1,092 (1,353) females of the former 949 (1,483) had gonorrhoea 323 (410) syphilis and 135 (211) suffered from both forms of infection the corresponding figures for females being 129 (549) 545 (112) and 99 (117) respectively. The distribution of new cases by districts (both sexes) reads Nicosia 1,493 (1,361) Larnaca 631 (596) Limassol 571 (588) Famagusta 423 (735) and Paphos 260 (345).

Helminthiasis—Schistosomiasis is restricted to one locality and is becoming less frequent. Out patients treated for ascariasis numbered 170 as compared with 201 in 1933.

For eye diseases of various kinds upwards of 25,000 cases received treatment, the principal conditions for which patients sought treatment being trachoma and its sequelae. Recorded cases were Trachoma 11,918 conjunctivitis 10,533 other afflictions of the eye 3,327.

No cases of smallpox undulant fever or plague were reported during the year. As regards the latter disease the work of rat destruction has recently been carried out more intensively and successfully 512 rats were trapped, spleen smears and carcasses being examined by the Government Bacteriologist. Nothing clinically or culturally suspicious of *P. pestis* infection was found. *Xenopsylla cheopis* was the most predominant rat flea found. (See also this Bulletin 1935 Supp p 114*) Vaccinations against smallpox numbered 14,288 (9,603) of which 11,118 (6,453) were primary vaccinations.

There were 95 inmates of the Leper Farm 14 of these being new admissions during the year. 1 died and 6 were paroled. There were 84 admissions to the Leper Farm Hospital and 10 (7) healthy children to the Leper Home.

The Report of the Mental Hospital observes that two additional blocks for female patients have been erected but that at least two more blocks are necessary to supplement the existing inadequacy of the male accommodation. At the end of the year there were 183 (174) patients 119 (116) males and 64 (58) females of these 52 were admitted during the year—viz. 41 males 11 females. The general health of patients and of staff was good only light cases of malaria influenza and diarrhoea being observed. Ten deaths occurred among patients at ages ranging from 27 to 64 years.

Special Reports—Six reports of particular interest form Appendices to the Annual Report. Their contents can be referred to but briefly in this Bulletin (a) *Report of Surgical Specialist*—Some reference to cancer work has already been noted (see above). Among other matters Dr CUFF speaks with strong disapproval of the manner in which anaesthetics are administered by local Medical Officers. Electro-therapeutic and X-ray work continue and the results though variable are encouraging. The treatment of serious fractures is to be carried out systematically on the lines of the Böhler Clinic in the future. A variety of tabular statements epitomizes the results of general surgical work, radium therapy etc. (b) *The Report of the Bacteriologist* records the examination of 9,833 (9,795) specimens the majority of them, 3,963 (8,874) being received from V.D. clinics. It is noted that private practitioners are making increasing use of the laboratory. Routine examinations and principal findings which are set out in great detail in five tables include 375 (195) blood films, of which 35 (15) contained

malaria parasites (see above under "Malaria") 5,043 Wassermann tests, 985 of which were positive, 402 (352) agglutination tests, giving positive results in 178 (166) cases (see above under "Enzyme test"). Reference has already been made to the results of examination of spleen smears and rat carcasses. At the Government Laboratory 2,225 (2,342) analyses were carried out during the year—of these 2,231 (2,321) were official samples and included 1,788 (1,073) of foods and drugs, 221 (209) criminal investigations. The general adulteration rate in samples of food and drugs again shows an increase, 23·9 (21·6) per cent and is accounted for by the policy of more intensive sampling. The adulteration of olive oil and milk was widely practised. Some mention has been made of water analyses carried out at the laboratory (see above under "water supplies"). The variation of the salinity of Larnaca Salt Lake (see this Bulletin 1935 Supp. p. 111) is again the subject of mention—the assembled data are summarized in this Report. 23 (16) candidates sat for the Government Chemistry Examination and 16 (7) were awarded the Certificate. Arrangements have been completed for the quarterly inspection of pharmacists, in place of the former half yearly practice.

Control of Professional Practice etc.—23 (18) medical practitioners, 1 (1) dentist and 5 (12) druggists and pharmacists were registered during the year.

Scientific.—The following papers by members of the Medical Department Staff were submitted and published—

- WILLIOTT S G & GORDON M. Poisoning by Caustic Soda.—*Brit. Med. Jl.* 1934 June 9 p. 1022
 CURR C H & GORDON M. Acute Intussusception in an Adult.—*Brit. Jl. of Surg.* 1935 Vol. 22 No. 87
 WILLIOTT S G. A Note on Some Ancient Copper-coated Silver Coins of Cyprus.—*Jl. Inst. Metals* 1934 Vol. 33 p. 291
 WOKES F & WILLIOTT S G. The Cardiac Activity and Toxicity towards Rats of Red and White Squill from Cyprus.—*Quar. Jl. Phys. & Pharmacol.* 1934 Vol. 7 No. 3 pp. 565-573
 AZIZ M. The Anopheline Mosquitoes of Cyprus.
 MARKIDES C S. Spleen and Blood Rates.

Recommendations.—These include (in addition to those previously made see this Bulletin 1935 Supp. p. 114*) additional Public Health Legislation, the appointment of full-time Health Officers in peripheral municipalities and a full-time Cypriote Health Officer in each district, the installation of sanitary latrines in villages, provision of portable X-ray apparatus for Nicosia General Hospital and the appointment of a Sanitarian as a member of Building Committees.

Financial.—Medical Department expenditure amounted to £10,634 (£48,898) or 6·9 (6·6) per cent of the total revenue of the Island during 1934.

GIBRALTAR (1934)

Gibraltar consists of a long mountain block ('the Rock') rising to a height of 1,396 feet, 3 miles long and $\frac{1}{2}$ mile broad joined by a low sandy isthmus to the southern extremity of Spain. The town is built on the western and southern sides of the Rock, facing the Bay of Algeciras; the northern and eastern faces are inaccessible cliffs.

Note—While the Medical and Sanitary Services of the Colony are under the supreme control of the Governor local administration of these services provides for the assumption of prescribed responsibilities by three authorities. The Colonial Government directly administer the Medical Services the City Council the Sanitary Services and the Board of Health, of which the Governor is Chairman matters concerned with the quarantine of vessels. The Annual Medical and Sanitary Report is a compilation of the work carried out by Medical and Sanitary Officials of the first two authorities mentioned above.

Vital Statistics—The results of a Census taken by the Police at the end of 1934 returned the total population of the Colony as 15,847 (16,397) comprising 14,790 (15,071) British subjects and 1,057 (1,326) aliens. Registered births numbered 383 (357) and deaths 225 (241) the resulting birth and death rates being 25.8 (21.7) and 15.2 (14.7) per 1,000 respectively. Deaths of infants under one year of age totalled 21 (14) and the infant mortality rate 54.8 (39.2) per 1,000 live births. [The birth and death rates indicate that these birth and death rates have been calculated on the basis of the numbers of British subjects only a practice which scarcely seems reasonable for the Report observes that 947 aliens resided in Gibraltar]. The numbers of alien births deaths and infant deaths are not separately distinguished.

Maternity and Child Welfare—These services are organized and continue to function as previously described (see this Bulletin 1935 Supp. p. 115*) The activities of the Child Welfare Centre have been well maintained the increasing popularity of this work is evidenced by the fact that average monthly attendances have risen from 50 in 1929 to 84 in 1934. During the year the Welfare Nurse paid 472 visits to the homes of children. Eight midwives were on the register during the year inspection of midwives equipment was carried out periodically by the Medical Officer of Health and in all cases proved satisfactory 174 (151) births, or 46.2 per cent. (42.2 per cent.) of the total births, were attended by registered midwives. The promulgation of the Midwives (Amendment) Ordinance 1934 provided an opportunity for embodying in the local law the provisions of the English Midwives Act 1918 relating to the suspension of midwives.

School Hygiene—It is only when the Nursing Staff is at full strength that it is possible to arrange for monthly visits to schools the practice was resumed during the last four months of the year. The School Clinic was continued at the Colonial Hospital on Saturday mornings attendances numbering 213. The School Dental Surgeon treated 805 (855) children during the year and in each of the schools gave lectures on the care of the mouth, teeth, etc.

Public Health Sanitation etc—The principal items of public health interest in 1934 experience were the absence of smallpox, the occurrence of a small epidemic outbreak of diphtheria (see below) and the low incidence of diseases over which sanitary control is possible.

Following consideration of the list of infectious diseases compulsorily notifiable it was decided to omit from the list *nasal pneumonia*, *pneumonia*, *gastro-enteritis* and *measles*, and to add *leprosy* a disease which during the past five years has produced five cases.

Mosquito control work continues. The necessity especially among the poorer tenements, of providing for the storage of fresh water for a number of days in tubs and other receptacles, adds to the difficulties of the work. The inspection of tanks to ensure proper mosquito-proofing involved the examination of 579 tanks of which 49 were defective. The fly nuisance was satisfactorily dealt with by the weekly disinfection of stables, early removal of manure and, during the summer months double collection of house refuse. Sewage disposal scavenging etc were carried out as before.

As regards water supplies the construction of Reservoir No. 7 of one million gallons capacity was completed and came into use in December 1934. The experimental borings, etc. referred to in earlier Reports culminated in the discovery and utilization of a new underground source of potable water at North Front. The necessary constructional works for tapping the new source of supply were carried out. Analyses show this water to be fit for dietetic purposes, but as a precautionary measure it is being sterilized by chloramine. Work is actively proceeding in the search for further sources, and in the provision of a further storage tank in the Rock.

The routine supervision of places where foods and drinks are sold is carried out by the Council's Sanitary Inspectors, who also take samples of foods for analysis in no case was legal action necessary in respect of exposure for sale of unsound food. The local supply of fresh milk is very largely supplemented from Spain. By law all imported milk must be boiled, pasteurised or sterilized. The serological examination of local goats is carried out twice a year while all milch cows introduced into Gibraltar are inspected and tuberculin-tested before their milk is made available for public use. The Public Markets have been maintained in good condition. Increased imports of Irish and Danish cattle and of frozen meat are recorded, all of most satisfactory quality.

Port Health Work.—At the end of October report of the occurrence of bubonic plague in Tangier was the cause of considerable anxiety. Necessary precautions were taken to deal with persons and ships arriving from Tangier in transit to other countries. Fortunately the outbreak was small and of short duration and no infection of man or rodent entered the Colony. 6,316 ships called at Gibraltar during the year. 56 cases of illness were landed from British and 27 from foreign vessels.

Hospitals Clinical etc.—At the Colonial Hospital 1,318 (1,264) in-patients received treatment, 1,256 being new admissions during the year. 88 deaths were recorded. Out patients numbered 11,129 (11,883). Now that La Linea has a well-equipped municipal hospital, the class of Spanish out patients recommended by the Alcalde of La Linea for free advice and treatment has disappeared. The large volume of shipping led to an increase in the number of seamen patients, 88 as against 54 in 1933. In the Maternity Department, among 189 (186) patients, 177 (176) births were recorded. The Isolation Hospital for the segregation and treatment of leprosy accommodated 4 lepers.

one fresh case of the neural type being admitted during the year. The Home for Sick and Aged Persons has accommodation for 74 persons a portion being set aside for the reception of pulmonary tuberculous cases. The question of the adequacy of the services for the treatment of pulmonary tuberculosis was the subject of a Committee Enquiry. Their report is still under consideration, but it is generally recognized that the means available for dealing with the disease in the Colony are insufficient.

Diphtheria.—21 (5) cases were recorded, one in April, the remainder during the last quarter of the year and of these 14 occurred in Catalan Bay Village. One case proved fatal. The original source of infection was not detected in all probability an undetected carrier among the children was responsible. 134 throat swabs were received and examined. 21 were new positive cases. *C. diphtheriae* was also found in 13 contacts. When patients persisted in carrying the germ in spite of treatment virulence tests were resorted to in 8 out of 12 such cultures from throat swabs (six of which were from contact cases) the germ was found to be fully virulent. All patients responded well to uniform treatment. 400,000 units of the serum were issued by the Public Health Department to the Colonial Hospital—the staff of which institution undertook the treatment of carriers—and to private medical practitioners. The question of immunizing all children on Gibraltar against diphtheria is being considered. 12 cases received in-patient treatment at the Colonial Hospital.

Malaria and other insect-borne diseases are not endemic in the Colony but 5 (2) cases were admitted to hospital, all five being sub-tropical infections. Of 20 blood smears examined for malaria parasites 8 proved positive.

Eight (1) cases of *enteric fever* were recorded, one of which proved fatal (hospital in-patient returns make mention of 7 cases of typhoid and 2 para-typhoid B). The infection in five of the cases was traced to sources outside Gibraltar. The report of the City Analyst and Bacteriologist observes that 16 blood specimens agglutinated *Bact. typhosum* "H," 6 *Bact. typhosum* "O" and 16 *Bact. paratyphosum* B a total of 38 cases of infection which appear to have escaped notification.

Pulmonary Tuberculosis occupies the fifth place as a cause of death, and there is little doubt that the number of cases notified does not accurately represent the prevalence of the disease. 22 fresh cases were notified and 19 deaths were ascribed to this cause. Of 123 specimens of sputa submitted to the City Bacteriologist for detection of the tubercle bacillus 23 per cent. contained the organism.

The Venereal Diseases Clinic at the Colonial Hospital treated 47 patients, of which 10 were mercantile seamen, and gave 211 (108) intravenous injections for syphilis. There were 32 admissions to the hospital for gonorrhoea 14 for syphilis and 4 for soft chancre. Though in the notifiable list, venereal diseases are not compulsorily notifiable, provided patients are undergoing specific and adequate treatment. The numbers given in the general table of notifiable diseases are therefore, no index of the incidence of these diseases in the Colony. According to the list appearing in the Report only 4 such cases were notified.

No case of smallpox occurred during the year but one case of *measles* the first since 1927 was recorded the infection was

traced to Spain and the patient recovered. The City Bacteriologist reported that of blood specimens examined 4 agglutinated for *B. melitensis*. Three cases of rabies in animals were recorded, the cases being confirmed by pathological examination at the Institut Pasteur du Maroc Tangier where anti-rabic treatment of one person bitten and one scratched, was carried out. 29 dogs and 30 cats were detained at the Observation kennels for varying periods up to 15 days, the muzzling order was maintained throughout the year while 94 stray and diseased cats were impounded and destroyed during the month of August.

A case of anthrax in an employee of H.M. Dockyard on leave in England was reported by the M.O.H. of the Borough of Finchley and was attributed to the use of a cheap shaving brush of Japanese origin purchased in Gibraltar. The whole supply, both wholesale and retail, was traced samples revealed the presence of *B. anthracis*; the public were warned by advertisement and the consignment was condemned. An Order was issued prohibiting the importation into the Colony of shaving brushes of Japanese origin.

In the Hospital Returns no case of dysentery is recorded, and a single case only in the returns of notifiable diseases, but the Laboratory Report observes: "Many stools were submitted for bacteriological evidence of the type of organism causing the disease. Cases of bacillary dysentery were due to *B. dysenteriae* (Flexner) and the types encountered were 'Some' 'Polyvalent' 'Strong' and Schmitz (*B. ambiguous*). The amoebic form of dysentery was again not met with during the year."

Laboratory Report—Specimens received for examination from Medical and Sanitary Officers Naval and Military Authorities, private practitioners and commercial sources totalled 4,588 (3,784). In addition to the usual routine work concerned with bacteriological tests of milk samples water analyses (see under Public Health above), examinations of throat swabs, agglutination tests, etc. (see under Hospitals above) the Laboratory Director reports the detection of the first case of *Br. abortus* in a Gibraltar cow. The isolated organism gave the morphological, serological and cultural characteristics of this germ while two other cows gave positive agglutination tests for this disease in a high dilution of their blood. Of professional interest also was the laboratory diagnosis of Leishmania which yearly attacks the hounds of the Royal Calpe Hunt with high mortality. Numerous blood examinations failed to reveal piroplasmoids, though Leishman-Donovan bodies were found in smears from the liver. The disease which resembled the canine kala azar met with in the Mediterranean littoral lacked the skin ulcers symptomatic of *Leishmania tropica* (Oriental Sore). Though the hounds were dipped weekly in a bath of 0.10 per cent. arsenous oxide, as a result of which they remained free from ticks, fleas, lice etc. nevertheless ten hounds succumbed to the disease. The conclusion reached was that these pests are not responsible for canine kala azar in Gibraltar.

Financial—Expenditure from Government funds on the Medical and Sanitary Services amounted to £21,593 (£21,662) or 10.6 (11.4 per cent. of the total revenue of the Colony).

MALTESE ISLANDS (1934)

The Maltese Islands, a group of islands in the Mediterranean Sea, are distant about 58 miles from the nearest point of Sicily, 80 from Syracuse, 142 from Reggio and 180 from the nearest point of the mainland of Africa. Malta itself is 17 miles long, 9 broad and has an area of almost 95 sq. miles. Gozo 28 sq. miles. Comino and Filfa are mere islets, the area of the former being about 1 sq. mile. The whole group has about half the area of the Isle of Man.

Total Statistics — The estimated population for the year was returned as 253 185 (251,832) distributed as to 230 124 (277 046) in Malta and 23 061 (24 786) in Gozo. [An error seems to have crept into the second reference to population figures on p. 2 of the Report where the distribution of population in Malta and Gozo quotes the 1933 data.] The population figures are presented in great detail in an Appendix being tabulated for each of the 30 localities in Malta and 8 localities in Gozo in age-groups 0-1, 0-5 and over 5 years of age.

Total live births numbered 8,544 (8,321) giving a birth rate of 33.5 (33.0) per 1,000. Of the total live births recorded Malta contributed 7,853 (7,603) with a birth rate of 34.1 (33.4) and Gozo 619 (716) with a birth rate of 27.6 (28.8). Stillbirths numbered 240 and abortions 919.

Deaths totalled 5,702 (5,091) with a rate of 22.3 (20.2) of which 5,192 (4,560) occurred in Malta with a rate of 22.6 (20.0) and 519 (531) in Gozo with a rate of 20.4 (21.4).

Infant Mortality returns record the deaths of 2,367 (2,149) children under one year, the rate being 277.0 (258.2) per 1,000 live births. 2,162 (1,925) of these deaths occurred in Malta and 205 (223) in Gozo, the infant mortality rates for these Islands being 275.3 (253.2) and 296.7 (311.4) respectively. Gastro-intestinal diseases were responsible for more than half the deaths and it is to the greater mortality under this heading that the rise in the mortality rate was due. Only in three populated centres was the rate below 200 while in each of thirteen rural districts the rate exceeded 300 per 1,000. [In an Appendix presenting infant deaths for each of the 38 localities Malta is erroneously credited with 6,162 such deaths during 1934.]

General Hygiene and Sanitation — The Committee appointed by Government to enquire into the method of *milk pasteurization* most suitable for adoption in the case of a Government or Government-controlled dépôt in the Islands reported their findings at length in an Appendix Ha attached to the Annual Report of Health. Subject to prescribed considerations they were of opinion that a high temperature short time installation would make the Maltese milk supply safe.

Chemical results in conjunction with the bacteriological show that water supplies derived from the high and low springs (see this *Bulletin* 1935 Supp. p. 118*) maintained a very satisfactory state throughout the year. Samples of water taken from public tanks in villages were found potable but 74 of 162 samples taken from private tanks in dwellings, shops etc. were unfit for drinking purposes and necessary steps were taken to amend these defects.

Following details of routine inspections made by the Veterinary Branch, the Report of the Principal Government Veterinary Surgeon records the prevalence of virulent *Swine Erysipelas* during the hot

weather in addition to the usual measures taken for dealing with the disease, the introduction of sero-vaccination gave promising results.

Various activities concerned with the promotion of hygiene and sanitation are described in great detail in special appendices J, L, M and N attached to the Report.

Port Sanitary Work — 1,752 ships, representing a total tonnage of 4,393,383 entered Malta ports during 1934. Passengers inwards numbered 11,511 and outwards 14,597. Routine measures adopted for dealing with inward ships and with patients suffering, or suspected of suffering from contagious diseases have been described previously (see this *Bulletin* 1935 Supp. pp. 118*–119*). During the year under review of the 808 (361) cases of communicable disease treated at the Infectious Diseases Hospital in the Quarantine Station four only were landed from ships, two being cases of measles, and two of enteric fever. On the other hand six additional cases were landed and admitted to other hospitals, two being cases of broncho-pneumonia and one each of measles, scarlet fever, enteric fever and pulmonary tuberculosis. Special Appendices K and K_a are devoted to a detailed description of the work performed by the Port Sanitary Staff during the year.

Clinical Returns etc — The general and the infant mortality experience during the year under review have already been mentioned. If deaths at the two extremes of life at ages 0–5 and 75 and over are considered it will be seen that these two groups were responsible for 2,831 and 615 deaths respectively, or over 60 per cent. of the total deaths recorded. The principal causes contributing to a less favourable mortality experience in 1934 were circulatory diseases 523, communicable diseases 469 [the Report says 468, but published records add up to 469], nervous diseases 374, respiratory affections (including tuberculosis) 343, cancer 163. Furthermore, deaths due to diabetes numbered 151 against 116 in 1933 while deaths ascribed to diseases of the puerperal state and early infancy totalled 758, compared with 730 recorded in the previous year.

As regards *communicable diseases* 17 notifiable diseases are listed in the Maltese Islands; a total of 5,018 (3,935) notifications was received with 469 deaths. Of these cases and deaths the following observations are submitted —

Undulant Fever — The disease assumed very high proportions during 1934 — 1,917 (1,713) cases being notified — the highest number recorded since 1917 with 88 (67) deaths. 1,788 cases and 76 deaths were recorded in Malta and 121 cases with 12 deaths in Gozo. The Report states a case-fatality rate of 4·2 per cent. as against 3·9 per cent. in 1933 though on the basis of published figures the rate should read 4·8 per cent. The prevalence of the disease was high throughout the year but unusually so during the first and third quarters. Of 6,358 (5,979) blood specimens from goats, 971 (780) or 15·3 per cent. (12·7 per cent.) agglutinated *Br. melitensis* and the animals were destroyed. The percentages of infected goats were highest between February–April (average 16·2 per cent.) and September–November (average 18·4 per cent.). The increasing prevalence of the disease during the past few years has made the problem of its prevention more urgent than ever. During 1934 the Government decided to subsidize further research with a view to the discovery of approved methods of campaign against the disease in man and in animals.

and also directed that investigations of the most suitable methods of pasteurization of goats' milk should be made (see above).

A widespread epidemic of *Scarlet fever* of the mild type usually experienced in these Islands occurred during the year and from May onwards was prevalent to an unprecedented degree. Late and non notification of cases plus mild ambulatory and incomplete and anomalous attacks combined to nullify the measures designed to check the spread of the disease by hospital or home isolation. 642 (20) notifications of the disease were recorded with 15 (1) deaths all the deaths occurring in Malta which was responsible for 635 of the total notifications received. As regards age distribution 370 of the cases occurred among the 5-15 age-groups and 227 among children under 5 years of age. The Quarantine Medical Officer who has charge of the Contagious Diseases Hospital (to which 508 cases were admitted and where 13 of these patients died) supplies in a Special Report (Appendix K_a) interesting information on the treatment and progress of patients under his care.

During the first quarter of the year sporadic cases of *measles* were reported until later the disease assumed epidemic proportions in a number of districts. 385 notifications with 8 deaths were recorded of which 230 notifications with 7 deaths were received from the district of Qormi on Malta. It is not without interest to note that although only 8 deaths are directly assigned to the title of measles of 95 deaths ascribed to *broncho-pneumonia* and 161 deaths ascribed to *acute bronchitis* 42 and 139 respectively occurred among children under 5 years of age. Moreover of the acute bronchitis deaths in this age-group more than one half occurred during the last quarter of the year a season unusually cold and wet, conditions which could contribute to the onset of respiratory complications in cases of measles among poorer children who would be allowed out as soon as the fever signs abated.

Influenza occurred in mild form in the spring and again towards the end of the year 520 cases were notified with 5 deaths. Cases of *chickenpox* were fewer 96 (155) distributed as to 91 (151) in Malta and 5 (4) in Gozo there were no deaths. *Diphtheria* was most prevalent during the autumn and winter 151 (127) cases in Malta with 20 (18) deaths, and 9 (6) in Gozo with 3 (0) deaths. Although cases of *endemic fever* were fewer 278 compared with 361 in 1933 the case-fatality rate was higher at 9.7 per cent. (8.3) 27 (30) deaths being recorded. 263 of the total cases notified occurred in Malta on which Island all deaths recorded occurred.

Notifications of *Pulmonary tuberculosis* numbered 182 (187) with 143 (115) deaths 174 notifications and 134 deaths were recorded in Malta. The Report supplies a review of tuberculosis experience for the two decennia, 1913-22 and 1923-32. The decline during the past twenty years is encouraging and may not be unconnected with diminished incidence. On the other hand, the yearly notified incidence may not indicate with great accuracy the extent of the prevalence of pulmonary tuberculosis. 106 (110) patients were admitted to the Connaught Hospital, the daily number of patients averaging 125 (124) at the St Theresa Hospital, Gozo in-patients averaged 16 and there were 12 admissions during the year. The question of the

inadequacy of the accommodation for patients and staff at the Connaught Hospital was the subject of enquiry during the year for the demand for institutional treatment exceeds existing facilities. Certain recommendations involving the annexation of adjacent buildings, etc. were made towards improving present conditions without delay. When the new General Hospital is completed it is hoped to establish a tuberculosis clinic and dispensary for the observation and treatment of cases.

Trachoma notifications were fewer in 1934 than in the preceding year 290 (329) cases being reported, comprising 164 (258) in Malta and 126 (71) in Gozo. The increased incidence in Gozo was made up entirely of children newly admitted to school whose disease had not until then come under medical notice. Children receive treatment at Government elementary schools, while district nurses treat children suffering from trachomatous and other conjunctivitis at five district centres in Malta. Other patients receive medical attention at the Government dispensaries in Malta and Gozo.

A single imported case of Smallpox was reported—the patient recovered after isolation and treatment at the Contagious Diseases Hospital. 4,628 primary vaccinations were performed—the Report says—in 1933—of which 4,318, or 93 per cent. were reported as successful.

INDIAN OCEAN

CEYLON (1934)

Ceylon, an island in the Indian Ocean, lying off the southerly extremity of India, has an area of 25 332 sq. miles exclusive of the Jaffna lagoon, the area of which is 149 sq. miles. Colombo on the west coast, is the capital. Its greatest length is 270 miles from north to south, and its greatest width is 140 miles. The total area is rather more than three-fourths that of Ireland.

Vital Statistics — The estimated mid year population for the whole Island was 5,551 623 (5,514,516). The distribution of this population and the relevant vital statistics pertaining to the three principal population groups were as follows —

Communities	Estimated population	Births	Birth rate	Deaths	Death rate	Infant deaths	IMR per 1 000 births
Cyberians	4,887 600 (4,844 182)	183 044 (184,574)	37.5 (38.6)	113,284 (102,935)	23.2 (21.5)	31,052 (28,465)	170 (154)
Europeans	10 000 (9,859)	122 (123)	12.2 (12.5)	77 (67)	7.7 (6.8)	1 (4)	8 (33)
Indians	654 000 (609,170)	23,346 (24,335)	35.7 (39.4)	13,709 (11,688)	21.0 (18.9)	4,666 (4,397)	200 (181)
Total	5,551 623 (5,514,516)	208,512 (209,032)	37.2 (38.6)	127,070 (114,690)	22.9 (21.2)	35,719 (32,868)	173 (157)

The last quarter of the year saw the beginnings of the great malaria epidemic which destroyed 80 000 lives in the space of seven months. The effect of the epidemic on the general death rate may be realized when it is noted that during the last quarter of 1934 alone 41,833 deaths were registered, as against 27,413 in the corresponding quarter of 1933.

As regards the vital statistics of the nine Provinces the North Central Province with the smallest population (97 200) had the highest birth death and infant mortality rates while the Western Province the most populous in the Island with a population of 1,504,500 had the lowest birth rate the second lowest death rate and the third lowest infant mortality rate recorded. The data relating to urban (that is 37 principal towns) and rural areas are of interest viz. —

	Birth rate	Death rate	Maternal Death rate	Infant mortality rate
Urban areas	34.6	31.9	34.0	192.0
Rural areas	37.6	21.5	16.2	170.0
Whole Island	37.2	22.9	20.1	173.0

The apparently high death rates in urban areas when *resident /* residents only suggest that these rates are due to the visits of ailing persons and expectant mothers from outside areas who are admitted to and die in the general hospitals and institutions established in the 37 principal towns and whose deaths are not transferred to the area of habitual residence.

Although the registration of births and deaths is compulsory throughout the Island the causes of death may not be regarded as reliable since in rural areas (wherein 87 per cent. of the population are resident) deaths are not usually medically certified and registration officials are not medical men. The data relating to the 37 principal towns are however more dependable for the majority of recorded deaths are certified by medical practitioners these data are separately tabulated. Among 23 638 (21,235) deaths occurring in the towns, 2,823 (2,293) or 11·9 per cent. were ascribed to pneumonia, 1,573 (1,282) or 5·8 per cent. to pulmonary tuberculosis, 1,148 (704), or 4·9 per cent. to malaria and 665 (505) or 2·8 per cent., to dysentery. As regards causes of death for the whole population, among the total of 127 070 (114 890) deaths recorded, pyrexia, with 15 487 (13,778) deaths and infant convulsions with 12,939 (11,086) continue to be the two principal causes of mortality followed by pneumonia, diarrhoea, and miasmes with 8,368 (6,900) 8,047 (6,609) and 4,873 (4,699) deaths respectively.

Maternity and Child Welfare.—At the ante-natal clinics held at the De Soysa Lying In Home 4,704 (3,499) mothers attended for advice or treatment on 6,131 (4,575) occasions, while 237 mothers paid 261 visits to the post-natal clinics. In addition, 3,852 (3,189) combined ante-natal and baby clinics were held at 78 (73) centres in various parts of the Island, recorded attendances being Expectant mothers 8,033 (4,850) infants, 23,324 (30,424) and pre-school children, 17,555 (15,753).

The De Soysa Lying In Home continued to be the chief training school for midwives in the Island 100 (95) women received instruction during the year. Other training centres are Green Hospital, Mampur and the McLeod Mission Hospital at Imaivil. 120 (120) trained midwives were provided by Government 68 at hospitals and 52 at health units. There were also 107 (90) trained midwives provided by local authorities and 82 (86) by estates, while approximately an equal number were engaged in private practice.

There are in the Island 41 (35) voluntary associations engaged in child-welfare work, 22 local authorities contributing to the finances of these associations.

School Health Work.—The reorganization of School Health work, previously described (see this *Bulletin* 1835 Supp., p. 122) was continued during 1834. The personnel engaged in this work comprised 6 (5) school medical officers 23 (25) medical officers of health, 31 (6) district medical officers and 6 (5) school nurses.

The number of schools in the Island is said to be about 5,000 with a school population of about 600,000. While the school population remains the same as that recorded in the previous Report, the number of schools had declined from 8,148 in 1833, to "about 5,000" in 1834 no explanation of this great change is provided. Health work was carried out during the year in 1,097 (990) schools, having a school

population of 203 696 (186,831) of which 59 064 were in boys' schools 41,939 in girls' schools and 102 693 in mixed schools

937 (529) schools were visited and 45,281 (60,791) children medically examined, the decrease in the numbers of examinees being due to the fact that school work had to cease by reason of the malaria epidemic. 33 153 (31,605) or 73 1 (52 5) per cent. of the total children examined were found to be defective the more common defects being dental caries 24 3 (24 0) per cent. hookworm infestation 15 2 (22 0) per cent., enlarged tonsils 10 4 (12 2) per cent. malnutrition 10 4 (10 0) per cent. and pediculosis 6 9 (9 0) per cent. These five defects constituted 68 per cent. of all forms of defect noted. Defects were corrected in 26 per cent. of cases noted treatment clinics being established at 8,883 centres throughout the Island.

Sanitation of schools has received considerable attention but while much good work has been accomplished, progress is slow and much more remains to be done. As regards health education 38 (29) training classes attended by 891 (1,191) teachers were held (see also this *Bulletin* 1935 Supp p. 123*) while routine health procedures were carried out in schools in all provinces

Quinine is administered during the malaria season in schools in hyper-endemic areas. During the year 18,137 scholars in 184 schools received this treatment. Hookworm treatment was given to 43,559 (38,668) children in 665 (957) schools. 4,032 children received anti smallpox vaccination while 2,430 first doses and 1,704 second doses of anti-typhoid inoculation were administered during the year.

Public Health Hygiene Sanitation etc—As a result of the unprecedented drought during July, August and September in the wet zone of Ceylon the year closed with an epidemic of malaria far larger and more devastating than any previously recorded in the Island. The North-Western, Western, Central and Sabaragamuwa Provinces were principally involved upwards of three million persons being affected, and it was estimated that half a million persons contracted the disease. It is the large number of deaths from malaria in December which chiefly accounts for the increase of the annual death rate from 21 2 in 1933 to 22 9 in 1934. Special arrangements were made to render medical aid in the epidemic areas where no hospital or dispensary existed treatment centres were established. The epidemic is fully described in Sessional Paper VII 1935 published by the Director of Medical and Sanitary Services.

General Sanitation—This service continued to be fairly satisfactory in urban and rural areas but the lack of an adequate staff of sanitary inspectors hindered the progress of work and made the effective control of communicable diseases a problem of extreme difficulty. Special efforts were devoted towards the provision of sanitary latrines provided with cement concrete squatting plates the programme of 15,000 new latrines for the year was nearly achieved but at the end of the year the malaria epidemic led to curtailment of the work. Night soil is usually disposed of by the Sanitary Board towns by trenching on sites specially selected though in some rural areas dry earth conveyance is in vogue. Compost making with night soil was carried out with success in some areas.

Scavenging and Disposal of Refuse continued to be carried out as previously described (see this *Bulletin* 1935 Supp p. 122*)

The provision of pure and adequate water supplies was a question which continued to receive the careful attention of the authorities. 123 (119) public wells were built during the year. The Division of Sanitary Engineering undertook a number of investigations and trial borings with a view to improving or supplementing existing supplies in various areas. Other activities included surveys into the causes of water shortage and recommendations for overcoming such difficulties, examination of possible sources of pollution, sampling and analysis of supplies, the preparation of plans for the installation of chlorination plants, etc. The inspection of all food exposed for sale and the control of food-handling establishments are in the hands of local authorities. All such traders have to be licensed, licences being renewed yearly on the recommendation of the Medical Officer of Health. There is no control of sale of milk in rural areas owing to lack of suitable legislation, and the present unsatisfactory state of things will continue until the proposed Milk and Dairies Ordinance is passed. The question of introducing a Pure Food and Drugs Ordinance was deferred until the establishment of a Public Health Chemical Laboratory could be provided for while the draft of the Suburban Bakeries and Aerated Water Factories Ordinance awaits the approval of the Attorney-General. Meat inspection, control of the regulations governing the storage of rice, housing, etc. remain as previously described (see this Bulletin 1933 Supp. pp. 123* 124*)

Health Units—The attempt to carry out district health work as far as possible on health unit lines was continued as originally planned. Special attention was devoted to latrine construction, hookworm treatment, school health work, the development of ante-natal clinics, trachoma investigation, etc. Funds generously supplied by the Rockefeller Foundation made possible the appointment of an additional medical officer to the health unit of Kalutara totamane for typhoid fever investigation and the appointment of a Laboratory Attendant to the same unit. During the malaria epidemic routine work was interrupted and the staff concentrated on anti-malaria activities.

The principal vital statistics of these health units may be summarised as follows:—

Total population	Births	Birth rate	Deaths	Death rate	Infant deaths	L.M.R.	Maternal deaths	N.M.R.
487,506 (484,241)	15,926 (17,889)	31.9 (35.3)	8,877 (8,142)	18.8 (18.5)	2,413 (2,348)	151 (150)	225 (220)	14.3 (14.4)

Child Welfare Centres in health unit areas increased from 44 in 1933 to 52 in 1934 and at these centres 2,709 (1,855) clinics were held during the year. 2,822 (1,473) expectant mothers attended on 5,386 (2,983) occasions. 14,523 (14,142) visits of 2,357 (1,982) infants were recorded. 2,072 (1,828) children of pre-school age attended on 11,983 (10,023) occasions.

In addition to these activities 72 (70) trained midwives made 102,398 (74,160) ante-natal visits to 13,612 (12,810) expectant mothers and attended the deliveries of 7,870 (6,823) mothers, while 20 (19) private

health nurses of whom 3 (5) were in training paid 42 422 (34 162) visits to 32,670 (28 676) homes. A health survey of 15,396 houses was carried out. 7 183 (8 795) school children were medically examined when 6 424 (6 659) or 89.5 (75.5) per cent. were found to be defective.

Measures taken to spread knowledge of Hygiene etc—The policy of concentrating upon health education in the schools was continued and out of past experience definite syllabuses and special procedures were established. The most distinct achievement was the evolution of a 100 days health training programme based on the fundamentals of health results of this scheme of work proving most encouraging. Training courses for teachers and a ten days course attended by Inspectors of Schools of all grades were prominent features of the scheme. Medical Officers of Health also attended the conferences and gave considerable assistance by delivering lectures on health topics giving practical demonstrations and by joining in the various discussions. Radio talks in English Singhalese and Tamil were given. Health exhibitions held at seven centres and a permanent health education exhibit set up. *Health News* was enlarged during the year and four issues of the journal made their appearance. Weekly health articles continued to receive prominence in both Singhalese and Tamil newspapers while the *Education Gazette* published health articles furnished by the Department in every one of its issues during the year.

Port Health Work—In addition to services previously described (see this *Bulletin* 1935 Supp p 125*) it should be observed that the technical work of the Quarantine Department is performed by medical officers apothecaries and vaccinators of the Department of Medical and Sanitary Services. The Port of Colombo has a whole-time staff of four medical officers while at the fifteen minor ports the local medical officers give part of their time to the work. No passengers are permitted to land at the small ports in the northern part of the Island, and ships discharging cargoes at these ports must be licensed. This is a necessary precaution for the shipping is mostly engaged in coastwise traffic with small ports in districts in Southern India, where smallpox and cholera are more or less endemic.

Owing to the rise in the price of rubber and tea 1934 saw a greater demand for labour with the result that there was a large increase in the numbers of persons passing through the Mandapam Quarantine Camp en route for Ceylon. Estate labourers who numbered 140 607 (32,888) and passengers 48,530 (42,468) were subjected to the usual medical inspection and treatment (see this *Bulletin* 1935 Supp p 125*) 37 (14) passengers and 95 (8) labourers were rejected on account of leprosy and 30 (8) labourers were rejected for other diseases. 58,346 (45,885) passengers proceeding from India via Tuticorin to Colombo passed through the Tataparai Quarantine Camp there were 46 (55) rejections of which 36 (48) were on account of leprosy.

Of the 48,889 persons from Southern India entering Ceylon under surveillance, 99.84 per cent. reported at their destinations and completed 12 days period of surveillance.

Hospitals Dispensaries etc—Hospitals with their bed accommodation, central and branch dispensaries, visiting stations etc. maintained by Government have been described and repetition is unnecessary (see this *Bulletin* 1935 Supp p 125*) The only changes

noted are 624 central and branch dispensaries etc., as against 608 in 1933 and estate dispensaries 728 as compared with 727 in the previous year. Muhandiram D D KARUKARATUZ J P of Bendupamulla, Gampaha, donated a block of four wards containing 30 beds to the Gampaha Hospital. This was opened by His Excellency the Governor on the 21st February 1934.

In-patients treated in the various Government hospitals numbered 251 320 (207 028) with 16,287 (13,900) deaths, giving a hospital mortality rate of 64.8 (87.1) per 1,000. At dispensaries and out patient departments 5 143,640 (3,763,231) persons received treatment, among the principal diseases being malaria 2,292 473 (1,189,075) helminthic diseases 693 772 (828,470) influenza 218 731 (192,413) venereal diseases 26 160 (27,496) the majority of which, 19,978 (20,676) were gonococcal infections dysentery 34,309 (22,814) yaws 10,366 (18,638) pulmonary tuberculosis 1,795 (1,709).

Distribution of cases among various hospitals was as follows: General Hospital Colombo—In patients 24,648 (21,237) out-patients 58,444 (40,752). An out patient clinic for diseases of women was started in October 1934 and held on Tuesdays and Thursdays 297 cases were seen. In the Pathological Department 35,478 (34,896) specimens were examined and reported upon.

Dental Institute Colombo—19,634 (18,899) new patients treated.

General Ear Nose and Throat Clinic—7,587 (6,501) new out-patients treated.

Dr Soysa Lying-in Home—8,563 (8,478) cases under treatment during the year 180 (191) maternal deaths with maternal mortality rate of 42.3 (47.5).

Victoria Memorial Eye Hospital—25,143 (22,605) new out patients and 1,965 (1,835) in patients received treatment 479 (508) children received treatment at the school clinics.

Females General Diseases Hospital—354 patients received treatment as compared with 348 in 1933. At the out patient department where general diseases among women and children are treated 28,030 (29,827) patients attended the most prevalent ailments requiring treatment being malaria, influenza, ankylostomiasis, venereal, digestive and skin diseases.

Lady Harcourt Hospital for Women and Lady Ridgeway Hospital for Children—4,035 (4,006) patients treated viz. women 1,254 (1,270) and children 2,781 (2,732). Of the 50 (48) pupils in the training school for nurses 22 (20) were in their first year.

Infectious Diseases Hospital (Anjula) Colombo—2,115 (2,573) cases of which 198 (268) proved fatal principal diseases treated were choleraic 910 (778) cases with 1 (2) death enteric fever 242 (276) cases with 62 (79) deaths dysentery 188 (391) cases with 27 (63) deaths. 195 plague contacts and 778 smallpox contacts were kept under observation, and of the latter 9 developed smallpox.

As regards *Out Station Hospitals* those of Kandy and Galle are the largest and most important. At the former 10,479 (8,847) admissions were recorded, with 797 (651) deaths. Malaria was responsible for 1,834 (658) cases with 84 (12) deaths eye diseases 1,069 (922) cases with 3 (3) deaths ankylostomiasis 623 (622) cases, with 46 (68) deaths and pneumonia 301 (164) cases, with 95 (68) deaths. At Galle Hospital 9,303 (8,743) in-patients received treatment, and 620 (533) died. Principal diseases treated were malaria 523 (506) with 17 (3) deaths ankylostomiasis 623 (485) with 41 (22) deaths enteric fever 273 (217) with 54 (47) deaths pulmonary tuberculosis 175

(167) cases with 23 (50) deaths. In the Laboratory 15 474 specimens were examined and reported upon. Training of midwives was started during the year and 12 midwives were trained.

The activity of institutions for tuberculosis, venereal diseases clinics etc., are referred to hereafter. Of specific diseases the following observations are submitted —

Malaria.—The disease dominates the pathological picture of the Island. During the year hospital admissions numbered 41 551 (23 101) with 888 (379) hospital deaths while 2,293,224 (1 199 075) cases received out-patient treatment. [The 1934 out patient figures in different parts of the Report are not in agreement. See above under "Hospitals etc."] During the 1934 epidemic (see above under "Public Health") the proportion of cases of the malignant type of the disease was greater than normal, and many deaths were due to cerebral malaria and to convulsions among children. Limits of space prohibit any comprehensive summary of features characterising the epidemic which was a catastrophe of the first magnitude. For full description the reader is referred to the admirable Report of Dr R. BRIERCLIFFE Director of Medical and Sanitary Services and that of Lieut.-Col. C. A. GILL, L.M.S. who visited the Island in the capacity of Expert Adviser on Malaria, these Reports being published as Sessional Papers VII 1935 and XXIII 1935 respectively. For present purposes it must suffice to observe that the same anti-malarial measures as in 1933 though more intensively and extensively applied were carried out (see this *Bulletin* 1935 Supp pp 127*-128*). See also this *Bulletin* 1936 Vol. 33. Entomological investigations in relation to the epidemic were commenced in November and were still in progress at the end of the year. They were chiefly directed towards the assembly of data relating to (a) the identification of the mosquito or mosquitoes actively concerned in the transmission of the disease (b) the determination of the relative prevalence and breeding places of the carrier species. Within an affected area some 1,200 square miles in extent *A. culicifacies* formed over 90 per cent. of the mosquitoes collected, and was the only species found to be infected with malaria parasites.

Estate labourers employed upon estates situated along river banks in the Western Central and Sabaragamuwa Provinces were chiefly affected during the epidemic. The figures provided by several dispensaries indicated a fairly high incidence of malaria among estate labourers though the intensity of mortality rates was less marked on estates than in the adjacent villages 95 deaths among estate labourers from malaria and malarial cachexia being recorded during 1934 as against 100 in 1933.

Dysentery cases and deaths showed increases over the returns for 1933. Registered deaths due to this cause in the whole Island numbered 2,279 (1,886) hospital cases 5,804 (5,299) hospital deaths 783 (663) and out patients treated for the disease 34 369 (22,614). The figures for out-patients show an increase of the disease in every Province as compared with 1933 experience and in the Central North-Western and North-Central Provinces the increase was very great. Among Indian immigrant labourers on estates deaths due to this cause totalled 491 (330). It was stated that 3 146 or 54 per cent of the 5,804 hospital cases were amoebic, and 1 690 or 29 per cent.

the areas visited. At the Hendala Leper Asylum 859 (826) patients received treatment during the year 84 (102) were discharged, 75 (37) died, leaving 690 (667) at the end of the year. 74 per cent. of admissions were Ceylonese and 26 per cent. Indian immigrants. Special treatment continued along the lines previously described (see this *Bulletin* 1935 Supp. p. 130*) with the following results—

	Number of patients	Remarks
<i>Hidocarpus Oil</i>	396	93 improved, 293 no improvement.
<i>ECCO</i>	123	28 improved, 105 no improvement.
<i>Salsolol B</i>	8	General improvement all patients.
<i>Iodine and Potassium Iodide</i>	10	5 developed reaction and were discontinued remaining 7 general condition improved.

At the Mantova Leper Asylum 234 (251) patients received treatment, 9 (47) were discharged, 21 (16) died, leaving 204 (189) in the Asylum at the end of the year. The results of treatment with *Hidocarpus Oil* and *ECCO* are not given. Experimental treatment with *Magnesia sulph.* was started. 1,542 injections were given on 21 days to 109 patients with the result that 16 showed marked improvement, 53 slight improvement, 32 no improvement, and 8 got worse.

Veneral Diseases.—The following particulars relating to cases treated at the four clinics in the Island are supplied—

General Hospital, Colombo, 1,008 (1,596) includes 348 (322) syphilis, 872 (815) gonorrhoea.

Port Clinic for Seamen, Colombo, 48 (2) includes 35 (2) syphilis, 13 gonorrhoea.

Female Branch Hospital, Colombo, 1,232 (1,179) includes 363 (349) syphilis, 498 (684) gonorrhoea.

Handy Dispensary 451 (434) includes 153 (142) syphilis, 234 (272) gonorrhoea.

In addition to the above, 6,667 (6,645) in patients received treatment in the various hospitals, 2,163 (2,288) for syphilis, 4,217 (4,191) for gonorrhoea, 8 (24) for granuloma venereum and 179 (161) for soft chancre. Among these patients 88 (91) deaths occurred. At dispensaries and out patient departments of hospitals in the Island 28,180 (27,496) persons received treatment.

The continued decrease in the number of cases of yaws (parasitic) attending for treatment testifies to the success of the campaign against this disease. During the year hospital cases numbered 795 (1,045), hospital deaths 2 (3), out-patient cases 10,368 (18,386) and total deaths in the Island due to this cause 8 (5). The disease appears to be under control everywhere at present.

Helminthiasis.—Marked progress in the campaign against *schistosomiasis* was made the number of treatments given during the year being the highest since the commencement of the campaign in 1918. That this result should have been achieved, despite the interruption of activities on account of the malaria epidemic is extremely satisfactory. Administrative organization, personnel and procedure remained unchanged, the work being carried out as in previous years through the agencies of Government Medical Institutions, Campaign Dispensaries, Health Units, Mandapam Camp and Estate Medical Staff.

Total first attendances 4,944,492 exceeded the 1930 figures of 3,882,663 but the percentage of treatments to first attendances was lower owing to the malaria epidemic and consequent large number of patients unsuitable for treatment. Total treatments carried out by all agencies were as follows —

	1931	1930
Government Institutions	1,310,817	1,308,409
Outside Institutions (treatments by Government (20%)	81,907	
Campbell Dispensaries	309,855	309,617
Health Units	77,755	76,621
Kandian Camp	125,848	114,458
Estate Medical Staffs	109,637	128,916
Total	1,891,915	1,871,449

Eleven cases of patients showing symptoms of poisoning after treatment with 9 (1) deaths were reported during the year. A special conference was held to consider the question of poisoning, and the following conclusions reached —

(i) The majority of the deaths occurred after combined treatment but the symptoms incriminate *Oleum Chenopodi*. (ii) the dosage of *Oleum Chenopodi* given allows a large margin of safety for a healthy person and variation in ascaridole content is of minor importance. (iii) In all the cases reviewed the person treated was an unhealthy subject but there was no one condition common to all cases. (iv) Medical Officers and Apothecaries should pay special attention to the general condition of the patient. (v) In the case of patients seeking out patient treatment a light morning meal is desirable about two hours before hookworm treatment is given.

15,444 (13,674) cases of *ankyllostomiasis* received in patient hospital treatment with 721 (723) deaths and 915,237 (271,564) at hospital out patient departments and dispensaries. Deaths due to this cause in the whole Island totalled 2,118 (1,877). 31 (25) cases were admitted to hospital for *filariasis* and 480 (337) were treated as out patients.

Prisons and Asylums — On the whole the health of prisoners in the 12 prisons maintained by Government was satisfactory and the sanitary condition of prison hospitals generally good. In Jaffna prison dysentery and colitis prevailed as usual owing to defective sanitation. At Kandy there were 133 cases of influenza 86 of malaria 21 of dysentery at Anuradhapura several cases of dysentery and colitis at Matale 496 cases of malaria 347 of diarrhoea and enteritis 184 of influenza 94 of dysentery 15 of typhoid fever at Wellandri 461 cases of influenza 23 of chickenpox 39 of measles at other prisons very little sickness.

The Government Lunatic Asylum at Angoda was built to accommodate 1,200 patients yet the daily average number of patients during the past five years has been upwards of 2,300. During the year under review 3,399 (3,379) certified lunatics were under treatment and 2,307 (2,115) uncertified persons were under observation. In the Asylum 825 (788) cases of dysentery with 83 (203) deaths and 96 (135) cases of pulmonary tuberculosis with 84 (99) deaths were recorded.

Reference has already been made to the Leprosy Asylum maintained by Government (see under *Leprosy* above).

Scientific. — At the Bacteriological Institute 21,551 (20,627) specimens were examined and reported upon. The number of specimens of faeces

received from four institutions for examination for *E histolytica* and *Bac. dysenteriae* totalled 2,075 (2,358) and among the total, 314 (144), (61) or 5.5 per cent. contained *E histolytica*, and 415 (472) *Bac. dysenteriae*. The distribution of specimens and percentage of infections were as follows—

General Hospital	197 specimens	5.8 per cent.	<i>E histolytica</i>
Mahara Jail, Ragama	347	17.2	" <i>B dysenteriae</i>
Pusa Hospital	539	2.3	<i>E histolytica</i>
Lunatic Asylum, Angoda	942	17.6	<i>B dysenteriae</i>
		1.0	<i>E histolytica</i>
		11.6	<i>B dysenteriae</i>
		9.4	<i>E histolytica</i>
		30.5	" <i>B dysenteriae</i>

The doses of vaccines prepared and issued by the Institute numbered 43,453 (39,258).

At the *Pasture Institutes* 1,161 (990) persons received preventive inoculation against rabies—the principal areas from which these persons came were Western Province 400 (563), Southern Province 232 (47), Central Province, 186 (75) and Northern Province, 143 (170) these areas providing 83.5 per cent. of the total cases. It may be noted that during the year under review 58 (56) deaths were registered in the Island as due to rabies.

The number of brains from dogs and other animals examined was 375 (272), of which 173 (133) or 46.1 (48.6) per cent. were positive for sagni bodies.

At the laboratories attached to the Victoria Memorial Eye Hospital, and the Lying In Home Colombo 11,140 (8,113) and at the nine out station laboratories 103,016 (101,486) specimens were dealt with during the year.

The *Cholera Investigation* at Mandapam Camp (see this Bulletin 1935 Supp. p. 132*) was discontinued. The records of cholera in Ceylon for the past twenty years have been analysed and the data correlated with those resulting from the Mandapam investigation. Results appeared in the *Indian Journal of Medical Research* (April, 1935) under the title of "Carriers of *V cholerae* who enter Ceylon from South India." The work on nutritional deficiencies among school children commenced in 1933 was continued. Over 13,000 school children were measured and weighed and examined for signs and symptoms of vitamin deficiencies. A dietary investigation was carried out and the vital statistics for a decade analysed, especially with regard to infant child and maternal mortality. Mortality returns show that between 9,000 and 10,000 children—the majority under one year of age—die annually from a condition tabulated in the Annual Report of the Registrar-General under Title 153 (c) *Diseases of the Skin—Other Diseases under this title*, most of these deaths being due to a condition known locally as *ratha*. This is a fairly definite clinical and pathological entity, the disease being undoubtedly due to improper diet given at the time of weaning. Clinical and post-mortem studies of *ratha* are being continued.

The work of the division of *Medical Entomology* was mainly concerned with research and malaria control (see under *Malaria* above). Mosquito surveys were carried out in various areas. *Aedes vexans* were very prevalent in the Colombo Harbour area, breeding occurring throughout the Harbour premises in barges and lighters and

in ships arriving from African and Eastern ports. Investigations into the distribution and prevalence of House and Bazaar Frequenting Flies were continued (see this *Bulletin* 1935 Supp p 133*) The work was interrupted by the malaria epidemic but will be resumed and reported upon later. The anti rat campaign has been briefly mentioned under *Plague* above.

Published Scientific Papers during the year included the following —

- RATNAEYKE M. (a) Vesico-Vaginal Fistula.—*Jl Obstet Gynaec* 1934 Vol. 41 No 4 p 597
 (b) Acquired Atresia of the Vagina and its cure by Plastic Operation.—*Ibid* p 599
- FERNANDO S E. A Case of Pinta in Ceylon.—*Jl Trop Med & Hyg* 1934 October
- DE SILVA, S. The Stroke in Malaria.—*Jl Trop Med & Hyg* 1934 June.
- MICHAELIS L. (a) Vitamin A deficiency in Ceylon with special reference to the Statistical incidence of Phrynoderm and Sore Mouth.—*Ind Med Gaz* 1934 May Vol. 49
 (b) Vitamin A deficiency in Ceylon.—*Ibid* 1934 Aug
 (c) Sprue and Vitamin Deficiency.—*Ceylon Jl Sci Sect. D Med Sci.* 1934 Vol. 3 Pt. 3 p 173
 (d) Infection with the variants of *Bacillus ulcerans*—*Ibid* p 183.
- GUNAWARDENE, H O (a) Heart Disease in the Tropics—*Butterworth & Co (India) Ltd*
 (b) Traumatic Rupture of the Heart without External Injuries—*Brit Med Jl* 1934 Nov p 842.
- SELLAR, E C. Pernicious Anaemia in an Asiatic—*Brit Med Jl* 1934 March. p 578.

The following publications by officers of the Department appeared in the *Journal of the Ceylon Branch of the British Medical Association* for 1934 —

- JAYASURIYA J H F (a) Blood Transfusion in the Treatment of Diseases
 (b) Spinal Cord Tumour with compression Paraplegia
- FERNANDO G F Rheumatic Fever as it occurs in Ceylon.
- FERNANDO P B Cases of Mitral Stenosis
- ATTYGALLE, N Chorionepithelioma with secondary growths in the Vagina.
- FERNANDO B E. Pseudocoxyalgia.
- HOLE, C G Aberrant Obturator Artery
- FERNANDO S E. (a) Anophthalmia with orbitopalpebral Cysts
 (b) Oxycephaly (Acrocephaly acrobrachycephaly)
- KAVARATXAM S L Practical application of Preventive Medicine in Obstetric Practice
- GUNAWARDENE H C P (a) Chronic Appendicitis
 (b) Carcinoma of the Male Breast
 (c) Congenital Absence of the Rectum with stricture of the urethra.
- SIVARATNAM G S (a) Modern Methods in the Diagnosis and Treatment of Syphilis
 (b) Modern Treatment of Syphilis
- MILKOV P (a) Simple Method for tying ligatures and sutures in the depths of wounds.
 (b) A combined urethral dilating Bougie and Catheter
- Medical Education*—At the Ceylon Medical College the total number of students, both medical and apothecary showed a considerable diminution during 1934. This may be attributed to the fact that owing to commercial stagnation professional prospects are at present

less attractive than formerly and that recruitment to the Department of Medical and Sanitary Services of both Doctors and Apothecaries has been much reduced. Briefly summarized, the results of the year's work were as follows —

	Medical examinations		Apothecaries		
	Sat	Passed	Sat	Passed	
Pre-Medical	81 (55)	19 (15)	1st Apothecaries	43 (42)	23 (22)
1st Professional	46 (38)	20 (31)	2nd	37 (36)	16 (15)
2nd (Pts. I & II)	83 (84)	62 (68)	Pharmacists	—	0 (0)
Final	60 (44)	23 (19)			

For the Midwives Examinations 37 (38) sat for Class I and 81 (84) for Class II 31 (34) of the former and 78 (84) of the latter were successful.

General — Work is about to commence on the building of a new Bacteriological Institute to replace the old laboratories erected in 1899 and to form the first of a new group of buildings planned to form an Institute of Medical Sciences. A new Nurses Home to the General Hospital Colombo is also to be built. The new building, which will contain the necessary lecture halls, studies and recreation rooms, in addition to living quarters will form the residence of 100 pupil nurses while they are undergoing training at the General Hospital.

Dr BRADLAUGH calls attention to a number of important changes with regard to future conditions of service of the Medical Staff of the Department. It was proposed that House Officers posts at the General Hospital and other teaching hospitals in Colombo should not be filled by officers already appointed to the permanent establishment of the Department but should be thrown open to recently qualified men from the Ceylon Medical College, irrespective of whether they intended subsequently to join the Government Service or engage in private practice. In March 1934 the State Council accepted the recommendation of the Executive Committee of Health that the posts of House Officers should be made honorary and be filled by newly qualified persons who would be provided with quarters and would receive a subsistence allowance. The State Council also agreed that recruitment of the grade of Medical Officer in the Department will normally be by selection from among doctors who have served as House Officers.

Another proposal accepted by the State Council provided that the salary of future entrants to the grade of Medical Officer should be a full time salary and that the officers recruited should be whole-time officers with no right to private practice, the latter privilege being granted only under special circumstances and when necessary in the public interest. With the abolition of the right to private practice the commanding salary of newly appointed grade Medical Officers has been increased from Rs. 3,000 to Rs. 4,200 per annum. Six officers were appointed under the new conditions in December 1934.

Owing to an extensive epidemic of cerebrospinal meningitis in Northern India during the spring of 1934 and rumours of its spread to the Madras Presidency anxiety was felt lest the disease should break out in epidemic form in Ceylon. Among other precautions taken in the Island arrangements were made in each important Province for a Government Medical Officer conversant with the disease to be available free of charge to assist any medical practitioner with the diagnosis of a suspected case and to take specimens of the spinal fluid for bacteriological examination. An examination for carriers for the meningococcus was also undertaken among passengers arriving from India by the Tuticorin-Colombo route among school children in Colombo and among members of the Ceylon Defence Force. The investigation which proved negative was carried out by the City Microbiologist and the Director of the Bacteriological Institute both of whom had had considerable experience of the bacteriology of the disease.

Financial.—Exclusive of cost of new buildings and improvements to and maintenance of existing buildings expenditure on the Department amounted to Rs. 9 442 749 (Rs. 9 275 559) or 9 1 (8 7) per cent of the Revenue of the Island.

MAURITIUS (1934)

Mauritius an island in the Indian Ocean is distant 500 miles from Madagascar 934 from Seychelles, 1 300 from Natal and 2,300 from the Cape of Good Hope. It has an extreme length of 39 miles north to south and 29 miles extreme breadth east to west its area is about 720 sq. miles equal to that of Surrey.

Total Statistics.—The estimated population figure relates to the state of the population on the 30th of June and not as formerly on the 1st of January for a year under review.

The total mid year population in 1934 was estimated to be 391,867 (388,400). For the Colony as a whole population density averages 544 3 per square mile the range extending from 133 per square mile in the Black River District to unusual density of 3 418 per square mile in Port Louis. Registered births totalled 13,516 (13,479) of which 8,907 (8,909) occurred among the Indian population. The crude birth rate for the Colony was 34 5 (34 7) per mille. Deaths during the year numbered 10,069 (10,615) and the death rate 25 7 (27 3) per 1 000. Of the total deaths recorded 7,082 (7,513) related to the Indian population. Malaria continues to be the most important cause of death, followed by the pneumonias and diarrhoea and enteritis.

Infant deaths numbered 1,754 (1,773) giving an infant mortality rate of 129 8 (131 5) per 1 000 live births. 855 deaths were ascribed to diseases of early infancy 337 to infections and parasitic diseases and 274 to diseases of the digestive system. 1,307 (1,245) stillbirths were recorded, 1,025 of these occurring among the Indian population.

Maternity and Child Welfare Work.—The agencies concerned with the welfare of mothers and babies the direct activities of Government etc. were discussed in the last two issues (*see this Bulletin* 1934 Supp p 116* and 1935 Supp p 135*). Disappointing features of the work are the reluctance of Indian mothers to take advantage of modern

midwifery methods, and the lack of Indian women of standards of education sufficiently high to warrant their entry as candidates for training in midwifery. The names of four applicants were entered in the Register of Midwives, and eight candidates were awarded certificates by the Midwives Board during the year. It was decided to discontinue further training, the number of midwives in the Colony being deemed to be more than sufficient to cope with the work. Government midwives paid 2,616 visits to expectant and nursing mothers and conducted 612 confinements. Confinements conducted in hospitals numbered 1,033 as compared with 1,004 in the previous year. Deaths in the Colony registered as being due to puerperal state numbered 178—the maternal mortality rate was 13·2 per 1,000 live births.

Public Health Sanitation etc.—The bucket system, pit latrines, and on certain premises a water-carriage system comprising a septic tank and absorption pit provide for night soil disposed in the Colony. In some areas owners have applied for permission to instal a water closet and lead the effluent into a pit latrine. A limited number of these installations has been authorized in order to ascertain how the system will work.

The essential characters of water supplies of the Colony have been discussed (see this *Bulletin* 1935 Supp. p. 138*) and so far as rural areas are concerned the situation remains unchanged. A committee appointed to enquire into and report upon the quality of the Mare-aux-Vacoas water found the filtered water highly charged with suspended organic matter and with living vegetable and animal organisms. Bacteriological evidence led to the conclusion that the filters "are not only not reducing the total number of bacteria contained in the raw water but are actually adding bacteria to the water." Financial and other considerations limited the scope of the committee's recommendations two of the most important being that the water should be chlorinated before distribution, and that the crude water should be aerated before filtration. It is doubtful if aeration and chlorination will dispose of the smell and taste nuisance—a nuisance not confined to water of the Mare-aux-Vacoas filter bed.

Food.—On the whole the foodstuffs marketed are wholesome and of good quality. On the other hand, milk is seldom retailed in its natural state and, despite control measures and heavy penalties, sophistication is rife.

Training of Sanitary Personnel.—The new scheme of training (see this *Bulletin* 1935 Supp. p. 138*) was inaugurated in September. Out of 200 applicants only six candidates fulfilled standard requirements necessary for entry to the course.

Hospitals Dispensaries Clinical Returns etc.—The long spell of dry weather not only resulted in a decline in mortality in the Colony but also caused a diminution of morbidity the number of in-patients treated in hospitals falling from 27,689 in 1933, to 27,192 in 1934. 1,398 (1,470) hospital deaths were recorded. The classification of hospitals remains as previously described (see this *Bulletin*, 1934, Supp. p. 117* and 1935 Supp. p. 137*). The nursing establishment of the hospitals is still much below a reasonable minimum, and though additional staff was provided for in the estimates, it was not found possible to fill these posts.

New cases treated at the dispensaries totalled 173 926 (168,291) while the travelling dispensary serving the Pamplemousses district treated 10,544 (6 727) cases with a total of 13 105 (13 289) consultations.

Malaria admissions to hospitals numbered 2 723 (3 045) with 79 (114) deaths, the total number of deaths in the Colony ascribed to malaria and malaria cachexia being 1 884 (2 464). According to hospital returns total cases treated as in patients were 2 747 (3 086). The type of infection was determined in 1 169 (1 151) cases and of these 863 or 73.8 (92.9) per cent. were *P. vivax* 291 or 24.9 (6.1) per cent. were *P. malariae* and 15 or 1.3 (1.0) per cent. were *P. falciparum*. There were 20 (29) cases of blackwater fever with 3 (4) deaths. In the coastal lowlands where the disease is endemic existing drains channels and other anti-malarial works were maintained. Radical work in Port Louis was not attempted for financial reasons. Active measures for the elimination of mosquito nurseries were confined to the Plaines Wilhems district which offered the best prospects of obtaining the most profitable results. From the Report of the Malaria Branch the following items of information are taken. The policy during the year was to attend specially to towns and villages of the Plaines Wilhems district with a view to discovering the amount kind and seasonal variation of the disease the actual and potential breeding places of anophelines etc. The survey commenced in Curepipe in 1933 was extended to the regions of Vacoas Quatre Bornes Rose Hill and Beau Bassin. Blood films were taken at the dispensaries at Curepipe, Vacoas and Victoria Hospital and the following results noted —

Dispensary	No. films	No. positive	Per cent. among indigenous cases			Per cent. among imported cases		
			M.T.	B.T.	Q.	M.T.	B.T.	Q.
Curepipe	—	107	35	—	—	14.3	60.0	25.7
Vacoas	522	231	37.4	30.7	31.8	30.8	46.2	23.0
Victoria Hospital	346	96	34.0	43.0	23.0	25.8	54.8	19.4

With regard to anopheline findings in the Plaines Wilhems district the larvae of *A. costalis* only were found during the year in the Moka area *A. costalis* were found 41 times, *A. funestus* once, and *A. maculipalpus* not at all—a real diminution of anophelism since 1931. Anti-malarial work included oiling use of larvivorous fish canalization drainage regrading and repair work.

No case of plague typhus fever cholera or smallpox was recorded during the year. Plague preventive work is referred to under Port Louis below. The Colony has been free from smallpox since 1913. During the year under review 9,284 (8 688) children or 68.6 (64.4) per cent. of the registered live births were vaccinated.

Notifications of cases of enteric fever numbered 126 (181). The only figures regarded as approximately accurate are those relating to Port Louis 8 (9) Plaines Wilhems 61 (81) and possibly Moka 17 (12). In the absence of adequate and early notification added to which it is believed that numerous patients suffering from mild enteric fever never see a doctor the Department can do little to prevent the spread

of the disease from a patient to other members of the household. The detection of the source of infection is usually impossible, while the possibility of carriers further complicates the problem. The small number of cases notified in Port Louis is ascribed to the chlorination of the water supply regarded as the safest in the Colony. Hospital returns record 85 admissions, total cases treated 69 and deaths 15 the only type isolated was *Bac. typhosum*.

Dysentery appears to be unmentioned in the text of the Report, though it is noted that 1,322 (1,063) cases were treated as hospital in patients with 105 (71) deaths. The type of infection was determined in 981 cases 703 or 71 per cent. being amoebic, and 288 bacillary. In addition there were 5,144 (3,748) out-patient cases, the type of infection being determined in 3,262 cases of the latter 2,814 or 80.1 (80.7) per cent. were amoebic and 648 or 19.9 (9.3) per cent. were bacillary.

Tuberculosis (all forms) was responsible for 687 (863) in-patient hospital cases with 82 (120) deaths, and among these cases 589 (72%) or 83.3 (84.0) per cent. were suffering from phthisis. Among 1,893 (1,980) out patients 1,598 (1,951) or 94.4 (98.5) per cent. were pulmonary cases of the disease. The *pneumonias* constitute another serious cause of sickness and mortality in patient cases numbering 509 with 171 deaths and out patients 479. Of the in-patient cases 171 with 33 deaths related to lobar pneumonia. Other respiratory affections included *bronchitis* 819 in patients with 54 deaths, out patients 5,250 *asthma* in patients 239 with 6 deaths and out patients 1,968.

Helminthiasis.—Hookworm is largely a domestic problem, for the rural dweller does not yet realize the necessity of using his latrine habitually if infection is to be avoided. The disease is a noteworthy cause of hospital deaths. A certain proportion of cases are characterized by a grave anaemia and extreme debility, generally so ill on admission that recovery is hopeless. During the year under review among 2,273 (2,823) in patients receiving treatment 108 (120) hospital deaths were recorded and in addition 20,314 (17,207) out-patient cases were dealt with. The Report of the Hookworm Branch records a total of 88,317 (84,283) treatments to 50,011 (47,883) persons during the year. Hospital in patient cases of schistosomiasis numbered 50 (58) and out patients 301 (201) no deaths were recorded. During 1933 evidence was obtained pointing to *Bulinus (Pyrgophyza) forsteki* as the local molluscan vector of *S. haematobium* (see this Bulletin, 1933 Supp p. 140*) During 1934 the Research Branch of the Entomological Laboratory undertook a survey of the distribution of *forsteki* in the Plaines Wilhems area, the whole course of the Plaines Wilhems River and its tributaries being found to harbour this snail. Animal infection experiments were attempted unsuccessfully on several occasions with cercariae obtained from experimentally infected *forsteki*. This investigation still continues.

Other helminthic diseases reported in hospital returns were *Acanthocephala* in patients 147 (157) with 8 (7) deaths, out patients 6,846 (6,306) *filariasis* in-patients 47 (55) no fatal case and out patients 74 (80).

Few of the commoner deficiency diseases have been recorded in the Colony during the past five or six years a somewhat remarkable fact having regard to the strained economic circumstances during the

period. Two cases of scurvy and 11 of beri-beri were observed during 1934. In December the Medical Superintendent of the Civil Hospital recognized in a negro girl a papular skin condition manifesting vitamin A deficiency and this recognition led to the discovery of two more cases, one a brother of the patient the other no relation. Medical officers were circularized the condition described and reports of other cases complying with the description called for.

Venereal Diseases—In patient cases treated for syphilis numbered 280 (497) for soft chancre 124 (63) and for gonococcal infections 225 (281) admissions during the year being 390 (486) 121 (61) and 220 (271) respectively. Out patient cases were syphilis 1,204 (1,158) soft chancre 257 (86) gonococcal infections 984 (909) and granuloma venereum 18 (24). The treatment centre for seamen under the Brussels Agreement, 1924 is at the Civil Hospital Port Louis.

With regard to leprosy at the beginning of the year there were 47 (43) inmates at the Leper Hospital during 1934 admissions numbered 11 (9) discharges 6 (2) and 4 (2) deaths were recorded so that there remained 48 inmates at the end of the year. No feature of outstanding interest is recorded in the Report of the Leper Hospital.

Scientific—The Bacteriological Laboratory buildings received much needed attention. The installation of new bench and sink accommodation was completed and the introduction of adequate lighting is anticipated. General routine operations were continued and though no outstanding new methods were introduced slight improvements in technique were adopted from time to time broadly to the lines employed in 1933 (see this *Bulletin* 1935 Supp p 199-200).

A total of 9,633 (9,097) specimens was received for examination covering most branches of applied pathology. Out of 203 blood films examined for the presence of malaria parasites 29 were positive 17 with *P. falciparum* 9 with *P. vivax* and 3 with *P. malariae*. Faecal specimens numbered 1,092 (680) ova of *Trichuris* being found in 593 taeniasis in 285 and ascaris in 246 Kahn tests totalled 3,644 (3,874) with 1,098 (1,826) positives one to four plus and 118 (201) had doubtful reactions.

Full and detailed examinations biological bacteriological and chemical were made frequently of the Mare-aux-Vacoas water supply of the Port Louis supply and of other public and private supplies. Milk samples were examined at quarterly intervals and of exhibits submitted by the police and from other sources as received.

Extra-routine work concerned with investigations of more than usual interest included the continuation of the schistosomiasis research work to which brief reference was made in the section headed *Heliobolusiasis* above. This work is being further pursued. A considerable amount of time and energy was devoted to the study of trypanosomal infections in local stock animals and working in collaboration with the Government Veterinary Surgeon field work was undertaken and a preliminary survey of the existing situation carried out. Morphological and animal-infection investigations led to the conclusion that the trypanosomes which had been found in cattle reported as being infected with *Surra* (the disease introduced in a consignment of cattle from India in 1901) were not *T. evansi* but that they were *T. vivax* an African trypanosome causing *N'gana*.

This discovery in addition to its pathological significance, is of great local and economic importance for it is clear that among the stock in Mauritius there are at least two distinct trypanosomal diseases, the first of Indian and the second of African origin. Work is in progress on the incidence of the two diseases, the Report continuing —

The shortage of funds and of suitable accommodation of rapid transport and of outside staff for the proper conduct of an enquiry normally rather outside the sphere of the departmental medical laboratory has been realised, and steps are being taken to enquire into the most suitable methods and lines to be followed in investigating trypanosomiasis of local stock in a thorough and efficient manner. That the distribution, virulence, methods of spread and possible treatment of these diseases should be established, is of fundamental economic importance to the Colony as well as being of the utmost scientific interest while the fact that one African trypanosome has managed to establish itself in the Island in the complete absence of its normal biological vectors *Glossina* spp. makes it eminently possible that other African trypanosomes may have done the same. *T. congolense*, a close associate of *T. evansi* in Africa, has modified itself in Zanzibar to transmission by biting flies other than tsetse in the total absence of the latter but apart from an isolated and rather incomplete observation of a similar performance on the part of *T. evansi* in French Guinea this latter trypanosome has not before been demonstrated conclusively to be able to flourish under such conditions.

The following papers were published by members of the Laboratory staff during the course of the year —

ADAMS, A. R. D. & WINS LEWIS. A survey of the protozoal and helminthic infestation rates of the male prison and reformatory inmates of Beau Bassin Prison, Mauritius.—*Ann. Trop. Med. & Parasitol.* 1934. Vol. 28. 25.

ADAMS, A. R. D. Studies on Bilharzia in Mauritius. I. The experimental infection of *Bulimus (Pyrgophyllum) forschali* with *Schistosoma haemobium*.—*Ibid.* p. 195.

Two Appendices to the Mauritius Report describe in some detail health conditions in Port Louis and Rodrigues respectively and from these two accounts the following summaries are compiled —

Port Louis.—Estimated mid-year population, 54,687 (54,301). Registered births were 2,104 (2,019) and deaths 1,419 (1,520), the resulting birth and death rates being 38.5 (37.2) and 25.9 (28.0) respectively. Stillbirths numbered 169 (180) and infant deaths 25 (270) the infant mortality rate being 115 (138.5) per 1,000 live births.

Deaths ascribed to malaria and malaria cachexia were 87 as compared with 148 in 1933.

Sanitary surveillance over the rodent population in the harbour and adjoining areas was continued. 12,506 (10,540) rats were caught, but none showed signs of plague. The risk of introduction of plague from Madagascar is regarded as more serious now that ocean-going ships are berthed at the deep-water quays at Tamatave. Grain imported into the Colony is stored in the granary as previously described (see this *Bulletin* 1935 Supp. p. 138*).

Rodrigues.—The population figure is not given. Live births numbered 383 (380) and deaths 183 (103). The death-rate was stated

to be 20.3 (12.7) therefore the population may be calculated as 9,015 and on that basis the birth-rate [not stated] would be 42.5 (46.8) per 1,000.

The need for protecting water supplies by storage and filtration is emphasized, while in view of extensive soil pollution it is necessary to enforce safer and more regular disposal of human excreta than has hitherto been the practice.

1934 was a year of epidemics and misfortune—six epidemics a cyclone and a partial famine being recorded. 328 cases of *gastro-enteritis* with 24 deaths were noted 73 cases of *enteric fever* with 19 deaths 468 cases of *bacillary dysentery* with 9 deaths 113 cases of *arterial jaundice* with 1 death there were fewer cases of *influenza* with 11 deaths and an extensive but mild outbreak of *chicken-pox*. During the previous year 770 healthy persons emigrated to Réunion, but 687 of them returned in 1934 bringing with them beriberi, malaria, enteric fever, bacillary dysentery and measles to a semi-starving community. Among these returned emigrants 83 cases of beriberi 28 cases of malaria 2 of measles 1 of typhoid (fatal next day) together with cases of dysentery, scabies etc. were noted.

Hospital inpatients numbered 583 (384) and 48 (14) hospital deaths were recorded while attendances at the two dispensaries totalled 15,533 (16,545). Malaria, respiratory and digestive affections and *iscanasis* were among the principal diseases treated. Of 20 deaths due to tuberculosis 15 were due to the pulmonary form of the disease.

There are 22 known lepers these including two new cases detected during 1934 16 are under treatment.

Financial.—Total expenditure on Medical and Sanitary services including municipal expenditure under the Department's control amounted to Rs. 1,587,958 (Rs. 1,298,163) a sum representing 9.6 (8.9) per cent of the total revenue of the Colony.

SEYCHELLES (1934)

The Seychelles Islands 92 in number are situated in the Indian Ocean between 4° and 10° S latitude. Their total area is estimated as 156 sq miles. Mahé the largest is 17 miles long and 3 to 7 broad with an area of 58 sq miles.

Vital Statistics.—The estimated population on the 31st December 1934 was 29,406 (28,731). Registered births numbered 862 (821) and deaths 317 (346) the resulting crude birth and death rates being 29.3 (28.6) and 10.8 (12.1) per 1,000 respectively. There were 12 (67) deaths of children under one year the infant mortality rate being 48.7 (81.6) per 1,000 live births. Stillbirths numbered 57 (51) and the stillbirth rate 66.1 (62.1) per 100 live births. The Report adds "The registration of births, stillbirths and deaths is compulsory and these returns can be taken as accurate."

Maternity and Child Welfare.—For reasons of economy reorganization of the Maternity Section of the Seychelles Hospital became necessary. The Matron of the Hospital became Matron of the Maternity Section, replacing the former Head Midwife and another Midwife at a lower salary was engaged. A Lady Health Visitor resident at the Hospital will shortly be available for visiting expectant mothers.

and children in the Central and country districts. Revision courses are also to be arranged for those midwives who still receive a retaining fee from Government for free attendances on pauper people in rural districts. While attending revision courses they will continue to draw their usual salary and will, in addition, be allowed free quarters and rations. Classes in practical midwifery are held and lectures given regularly to probationary nurses by one of the staff. During the year one probationer qualified for her midwife certificate and one received the Diploma of Medical and Surgical Nursing and Midwifery.

Admissions to the Maternity Section were 213 (233) there were 167 (230) live births. Two maternal deaths occurred during the year. One was a case of a woman who had had a four and a half months' abortion outside the hospital, and had been sent in on the eve of her death—the other woman died suddenly from pulmonary embolism four days after a perfectly normal confinement with an uneventful afebrile puerperium.

Ante-natal and infant welfare clinics are held at the Hospital twice a week.

School Hygiene—Twenty-seven grant-in-aid schools in the Colony continued to be inspected at periodical intervals by Medical Officers of the Department. Ventilation and lighting in the schools was reported as sufficient but latrine accommodation in some cases leaves much to be desired. It is intended as soon as departmental organization permits to appoint a Medical Officer with the special duties of School Medical Officer. Under the proposed arrangement more frequent inspections of schools and more systematic examinations of school children will become possible.

Public Health Sanitation etc—The health of the Colony was generally satisfactory. No outbreak of epidemic disease occurred, and the death-rate at 10·8 per 1,000 was the lowest on record. The general standard of physical fitness of the poorer classes leaves much to be desired. Ankylostomiasis, venereal diseases, deficient diet and other factors account for much chronic ill-health among this class of people.

The method of *rubbish disposal* by trenching introduced in 1933 (see this *Bulletin* 1933 Supp. p. 143*) continues to be satisfactory though it requires careful sanitary supervision. It is probably the most suitable method for the Colony so long as sufficient ground remains available for that purpose. In country districts the local Boards of Health are responsible for the collection and disposal of refuse and in the Central District the Victoria Town Board carries out this work by house-to-house service. The *drainage of surface water* by means of open gutters is not altogether satisfactory in some areas after heavy rains as collections of stagnant water remain and serve as breeding places for mosquitoes. The attention of the local Boards of Health has been called to these deficiencies.

Although the *water supply* is good and, if taken directly from the mountains free from pathogenic organisms, a special river ranger is advisable to patrol catchment areas to guard against pollution of supplies.

With regard to *food* examination of meat and fish exposed for sale continues to be carried out by a Sanitary Inspector. The bulk of the population are rice-eaters. The value of vegetables and fruit is not as fully appreciated as it should be, and attempts are being made to

encourage the people to grow green food to supplement their usual diet, though few native labourers seem to respond readily to this encouragement.

Training Personnel—Instruction continues to be given to Sanitary Inspectors by Medical Officers (see this *Bulletin* 1935 Supp p 143*) Sanitary Inspectors are also instructed to make use of every opportunity during the course of their ordinary duties to advise the public on all matters relating to hygiene.

Port Health Work—As anopheline mosquitoes are not found in the Colony the potential danger of their importation by ships arriving from malarial countries within short distance of the Seychelles receives special consideration. Such ships are carefully inspected and fumigated, and their water tanks examined for anopheles or larvae. Full quarantine was imposed on one vessel during the year a single case of smallpox having occurred amongst the passengers. Effective measures were taken and no other case of smallpox occurred amongst the contacts or elsewhere in the Colony. The agents of steamship lines have been informed that for the future all passengers proceeding to Seychelles from a country where smallpox is endemic must produce a certificate to the effect that they had been vaccinated not less than twelve days and not more than three years prior to embarkation.

Hospitals Dispensaries Clinical Returns etc—Admissions to the Seychelles Government Hospital numbered 824 (922) and the total number of patients receiving treatment at the dispensaries was 7 630 (5,709). Of the dispensary cases 3 735 (3 931) were treated at the Seychelles Hospital 2,453 (1,275) at the Anse Royale Dispensary and 1,442 (503) at the Praslin Dispensary.

No case of malaria has occurred in the Colony since 1931. The three cases treated at the Seychelles Hospital related to patients returning from East Africa or Madagascar. Although cases of dengue fever are occasionally seen among private patients no case was admitted to hospital during the year.

Fourteen (16) cases of amoebic dysentery received treatment as inpatients.

Leprosy—The incidence of leprosy remains high. The known lepers on the 1st January 1934 numbered 87 five new cases were detected during the year and five deaths occurred during the same period. 36 of these lepers are segregated at the two Leper Camps and 51 at their own homes. The unsuitability of the two islands used for segregation was referred to in a previous issue (see this *Bulletin* 1935 Supp. p 143*) An ideal leper colony could be established on the adjacent island of Curieuse and removal is strongly urged.

The new Leprosy Ordinance provides for the systematic examination of contacts and all patients discharged on parole 80 of the 87 known cases of leprosy have been classified (seven refused to be examined) the proportion of neural to cutaneous and mixed cases is about equal. With regard to age classification of the cases the peak is reached in the 36 to 45 age group. As leprosy is considered by some authorities to be a disease of childhood and adolescence it is possible that a systematic examination of school children would reveal a larger number of early cases in the first two decades of life. It is hoped to carry out a survey of selected districts where the disease appears to be more prevalent.

Ankylostomiasis remains one of the main causes of chronic ill-health especially in some of the country districts. The provision of latrine accommodation on all premises is compulsory but so long as the natives continue to prefer polluting the soil with their excrement, instead of using the latrines, just so long will the risk of infection continue. Mass treatments repeated at frequent intervals are at present the only practicable means of keeping the disease under control, and during the year a total of 83,317 such treatments was carried out. Only three cases of the disease are mentioned in the Hospital Returns as having in-patient treatment.

Venereal Diseases are stated to be very prevalent but no accurate figures are available. It is pointed out that many patients seek the advice of native herbalists and sorcerers and are never seen by medical men for proper examination and treatment. *Syphilis* is said to be of a milder type than that usually seen in Europe but on the other hand, many of the diseases of the arteries and circulatory system are stated to be of syphilitic origin.

Other Diseases.—During the year under review 10 cases of *Cancer* were admitted to hospital, against 6 in 1933 only one hospital death was ascribed to malignant disease, but there were 12 such deaths recorded in the Colony as a whole. Chronic constipation probably due to injudicious dietaries is very prevalent and may be responsible for high incidence of the diseases of the appendix noted. 27 cases of *appendicitis* received treatment in hospital during the year. *Asthma* appears to be the most common of the diseases in the respiratory group of 44 respiratory cases admitted for hospital treatment 18 related to asthma.

Financial.—Estimated medical and sanitary expenditure for 1934 was Rs. 95,999.00 and actual expenditure was Rs. 78,509.63, or a saving of Rs. 17,489 on the estimated medical budget. His Excellency the Governor at a meeting of the Legislative Council expressed his warm appreciation of the efforts made by the medical staff which had made possible this considerable saving in expenditure, a result which, in his opinion, had been achieved without in any way substantially affecting the usual services of the Medical and Health Departments, *vis-à-vis* the public.

FAR EAST

FEDERATED MALAY STATES (1934)

The Federated Malay States are situated on the mainland of the Malay Peninsula, closely connected with the Straits Settlements. They comprise four States—Perak, Selangor, Negri Sembilan and Pahang. The total area is 27,648 sq. miles. The principal towns are Ipoh, Taiping, Kampar and Teluk Anson in Perak; Kuala Lumpur and Klang in Selangor and Seremban in Negri Sembilan.

General—Dr W. M. CHAMBERS Acting Adviser Medical Services reports that the policy of decentralization referred to previously (see this Bulletin 1935 Supp. p. 145*) has now been fulfilled and its completion has not resulted in any observable deterioration of efficiency either in the State medical departments or in the co-ordination of health measures for the country as a whole. The only Federal institution now subject to the Medical Adviser's control is the Institute of Medical Research. The Central Mental Hospital, Tanjong Rambutan, and the Sungai Buloh Settlements ceased to be under his control from the end of 1934 and were allocated to the States in which they are situated, the former being placed under the administration of the State Medical and Health Officer, Perak, and the latter under that of the corresponding medical officer in Selangor.

Owing to unexpected resignations and retirements of a number of senior officers and unforeseen casualties among junior officers a temporary shortage of personnel was experienced towards the end of the year. Difficulties thus created were overcome by the ready acceptance of additional duties by remaining staffs and the helpful co-operation of various State administrations.

It was not found necessary to retrench any officers during the year under review and specialist services were adequately maintained.

Vital Statistics—The estimated mid year population returned as 1,631,729 (1,597,770) is the figure used for the purposes of calculating crude birth and death rates. Attention is called to the fact that the large numbers of immigrants to the States during the second half of the year are omitted from the mid year calculation, the population and its racial distribution on the 31st December 1934 being as follows—

State	Malays	Chinese	Indians	Others	Total
Perak	288,788	307,182	151,012	9,150	756,132
Selangor	132,243	234,538	151,336	13,597	531,714
Negri Sembilan	93,428	88,108	47,594	4,195	233,325
Pahang	116,830	50,276	13,433	1,881	182,420
Total	631,289	690,104	363,375	28,823	1,703,591

Registered births numbered 57,697 (56,787) and deaths 34,985 (32,340), the resulting birth and death rates being 35.4 (35.5) and 21.4 (20.2) per 1,000 respectively. Perak showed a slight decrease in its birth rate and the highest death rate for Malays.

There was a further increase in the infant mortality rate from 146 in 1933 to 163 per 1,000 live births for the year under review. This is an increase of 17 per cent. for the whole of the Federated Malay States, and means that the position has reverted to the 1930 experience. The increase is present in every State and occurs in every nationality except Indians, in Negri Sembilan. It is greatest in Pahang, which registers an increase of 36 per cent. and least in Selangor with an increase of 7 per cent. The increase among Chinese in Negri Sembilan and Pahang is noteworthy. The increases which are difficult to account for are not, it is believed, due to more complete registration.

With regard to *Labour on estates* there was a resumption of the immigration of Indian labourers, resulting in an increase in the total labour force from 134,703 in 1933 to 153,243 in 1934. The distribution of this population, number of deaths and death rates for each of the States are as follows --

State	Population	Total deaths	Death rate per 1,000
Perak	50,896	283	5.2 (5.1)
Selangor	51,609	279	5.3 (5.7)
Negri Sembilan	38,532	225	5.1 (5.3)
Pahang	11,109	63	5.7 (5.7)
Total	153,243†	877	5.4 (5.3)

† This total appears in the Report as 153,296.

The improved financial position of most estates enabled various improvements in the conditions affecting labourers to be carried out, and these have no doubt been instrumental in maintaining the comparatively high standard of health on the estates, despite the influx of new labourers during the year. The total estate population was returned as 213,909 (193,816).

On the ~~main~~ the great majority of labourers are Chinese, the numbers of mining coolies so employed in each State being Perak 27,380, Selangor 17,522, Negri Sembilan 1,156 and Pahang 3,873--a grand total of 49,733 as compared with 40,895 in the previous year.

With regard to labourers employed by various Government departments, it is observed that in common with other classes of labour their general health was satisfactory.

Maternity and Child Welfare Work.—In addition to the six Infant Welfare Centres previously mentioned (see this Bulletin, 1933, Supp. p. 146*) similar centres have been established in the State of Pahang, at Kuala Lipis, Kuantan and Pekan. Centres are under the control of a lady Medical Officer or a Health Sister who also undertakes the supervision of Malay midwives trained in Government hospitals and practising near these centres. The number of such midwives is steadily increasing and gradually unskilled midwives are being supplanted. At Infant Welfare Centres attendances totalled 179,908. Maternity cases are received into all Government hospitals and, in addition, there are maternity hospitals supported by the Chinese community in Kuala Lumpur and in Ipoh. Attached to the General Hospital

Kuala Lumpur is a maternity ward reserved for Malay women it is proving increasingly popular 52 women being delivered of their babies in 1934 as compared with 16 in the previous year. Health visitors from the Welfare Centres visit the mothers of newly born children, special efforts being devoted to induce Malay mothers to take advantage of facilities provided at the centres.

Experiments on the use of a soya bean compound as a substitute for milk were continued at Kuala Lumpur (see this *Bulletin* 1935 Supp. p. 147*) Data at present are too incomplete to permit its value as an infant food to be assessed.

School Hygiene—The usual school medical inspections were carried out during the year when 817 (935) schools were inspected and 49,852 (56,066) children examined. Physical defects noted during these school visits and percentages of each were as follows—

	Perak	Negeri		
		Selangor	Sembilan	Pahang
Dental disease	23.2	33.3	33.4	34.7
Flu disease	4.9	6.1	7.5	12.5
Eye defects	0.2	1.0	0.5	3.7
Spleen enlargements	6.9	4.5	14.1	13.03
Faeculoids	4.8	55.3	7.6	6.2

The distribution of dental caries among the different races is of interest. It is most prevalent among Chinese children and least in Tamils, and incidence in all races varies in direct ratio with proximity to towns or villages the cause, presumably arising from the less wholesome foodstuffs purchasable in towns. The mobile dental clinic visits vernacular Malay schools in rural areas and provides necessary treatments.

Public Health Sanitation etc—In the large towns sewage disposal methods include small septic tank installations serving single houses or small groups of houses and the pail system of night soil collection for the latter purpose rubber buckets are gradually superseding the use of metal pails. In suitable village areas the use of tube latrines continues. Refuse is collected in the large urban centres daily and conveyed to central incinerators. Drainage closely associated as it is with anti-malarial measures has always received particular attention in Malaya. Successful work was undertaken during the year in connection with a malaria outbreak at Batu Gajah, in the State of Perak. As regards water supplies important modifications of the methods of purification were tried. The combined use of sodium aluminate and aluminium sulphate was tested by the Division of Chemistry of the Institute for Medical Research at the Remban-Coast supply and the chloramine treatment was applied to the filtered supplies at Kuala Lumpur and Kampar. The latter method of sterilization is believed to be particularly advantageous in the tropics. The problem of securing satisfactory supplies for dwellers on the banks of the Perak river is the subject of special investigation.

Officers of the Health Branch regularly visited estates and mines throughout the year and insisted on the maintenance of a reasonable

(1934)

standard of health measures. Railway sanitation is controlled by the Railway Health Officer and his staff.

So far as available funds permitted steady progress characterised *Housing and Town Planning* schemes during the year persistent efforts being directed towards the improvement of housing conditions of the poorer classes.

Food—Bakeries, food and aerated water factories, markets, restaurants, eating shops, and piggeries continued to be closely supervised and strictly controlled by the health authorities. Endeavours to improve milk supplies in towns continued. Special attention was devoted to the sale of tinned foods. Beri beri still remains the principal food deficiency disease. During the year under review no less than 470 (384) new cases were admitted to hospitals throughout the States and 340 (254) deaths were ascribed to this cause—the increase was most marked in Selangor where 135 deaths were recorded as compared with 87 in 1933. The increase in mortality due to this disease coincides with a general improvement in general prosperity a condition which, perhaps, enables the poorer classes to indulge in frequent purchase of the more expensive highly polished rice.

Measures to Spread Knowledge of Hygiene—The activities of the mobile unit of the Committee for Public Health Education were somewhat hampered by mechanical break-downs, yet despite these hindrances valuable work was accomplished the films exhibited attracting large and appreciative audiences. A new lecture van has been ordered for future use. At the Agri-Horticultural Show at Kuala Lumpur health and infant welfare exhibits were staged and attracted some 15,000 visitors. Similar exhibits were displayed at various district shows with encouraging results.

The health lectures inaugurated in Perak villages in 1933 were continued 178 such lectures were given during the year.

Port Health Work—During the year under review 1,889 (845) ocean-going vessels and 1,004 (488) vessels exclusive of native craft, entered and cleared Port Swettenham. 129 vessels from infected ports were inspected by the Port Health Officer. 41 of these vessels brought 44,830 immigrants, all of whom were admitted to quarantine camps for the prescribed period of observation. There was no serious outbreak of infectious disease among immigrants or passengers no case of smallpox or plague, and only one case of cholera.

Hospitals Dispensaries Clinical Returns etc.—The more important facts relating to hospitals in the States are as follows—

State	Number of hospitals	Total beds	Total patients admitted	Hospital deaths	Deaths per 100 admissions
Perak	13	2,856	33,633	2,839	8.5
Selangor	7	1,580	20,497	1,626	8.0
Negri Sembilan	6	1,601	11,771	947	8.0
Pahang	7	653	9,430	580	8.2
Total 1934 (1933)	33 (36)	6,000 (6,337)	75,331 (76,297)	6,023 (6,034)	8.0 (7.9)

The principal diseases treated were malaria, 15,790 (17,146) admissions, with 517 (686) deaths influenza, 4,430 (3,788) with 9 (8) deaths venereal diseases 3,675 (3,769) and 101 (77) deaths bronchitis 2,639 cases with 58 deaths dysentery and diarrhoea etc. 2,415 cases and 463 deaths. The racial distribution of in patient cases and case-mortalities read as follows —

Race	Admissions	Deaths	Case mortality per cent.
Chinese	23,845	3,424	13.2
Indians	39,262	2,322	5.9
Malays	8,755	195	2.2
Others	2,054	90	4.4
Total	75,918	6,031	7.9

It may be noted that hospital data (which exclude data relating to prison hospitals and criminal vagrant wards) are not always in agreement in different pages of the Report under review. Attention is called to the higher case mortality among Chinese patients attributable to the reluctance of members of this race to enter hospital until disease is far advanced. Out-patients treated during the year totalled 607,643 (645,674) exclusive of those treated at Infant Welfare Centres school inspections, special clinics etc. and were distributed as follows

State	Numbers treated		
	At hospitals	At stationary dispensaries	By travelling dispensaries
Penang	70,893	78,336	64,014
Selangor	58,272	96,162	43,884
Negri Sembilan	40,181	22,875	18,582
Pahang	68,656	13,254	38,574
Total 1934	233,902	210,627	163,034
" (1933)	(264,684)	(202,114)	(178,496)

Malaria cases decreased by comparison with 1933 records, 15,790 (17,146) patients being admitted to Government hospitals, and 517 (686) hospital deaths being ascribed to this cause the decrease was most marked in Negri Sembilan, where 2,492 patients were admitted to hospitals as against 3,908 in the previous year. Diagnosis was confirmed by microscopic examination in 11,806 of the total cases admitted, sub-tertian infections constituting 64.4 (67.8) per cent. benign tertian 29.5 (25.0) per cent. quartan 3.1 (3.3) per cent. and mixed infections 3.0 (3.9) per cent. Among the 229,571 (238,516) bloods examined in hospital laboratories sub-tertian malaria was again the commonest infection, occurring in all four States—viz. sub-tertian 55.4 (60.2) per cent., benign tertian 39.2 (36.8) per cent. and quartan 2.8 (2.9) per cent. Eight (19) cases of Blackwater fever occurred, with 2 (7) deaths.

(1934)

Hospital returns record 225 (181) admissions for tropical typhus with 18 (17) deaths (in another section quoted as 228 cases and 17 deaths), the increase in the number of cases being in part attributed to more general recognition of the disease. Extensive research relating to the virus of tropical typhus, and concerning the problem of carriers of the three typhus-like fevers, was conducted at the Institute for Medical Research, where the investigations of Drs. LEWTHWAITE and SAVOOR have confirmed the great similarity if not the actual identity of the viruses of "rural" tropical typhus ("K" type) and Japanese river fever. The capacity of the rat flea, *X. cheopis*, to become a vector of "urban" typhus ("W") from rat to rat and probably from man to man has been demonstrated without doubt as the result of other experiments undertaken in collaboration with Mr. E. P. HODGKIN. This flea, however, failed to "carry" the virus of rural typhus, while negative results also attended experiments with the ticks *D. andersoni* (a vector of Rocky Mountain Spotted Fever) and *R. sanguineus*. Full details of these and other researches may be found in the separately printed Report of the Institute for Medical Research. It remains to add that Well-Felix reaction was applied to 1,167 specimens of serum from 871 patients. 181 were diagnosed as rural "K" and 20 as urban "W" type cases of tropical typhus.

Leprosy.—At the beginning of the year leper patients at the Sungai Buloh Settlements numbered 1,104 (1,082), and by the end of the year these had increased to 1,320; the total number treated during the year being 1,695 (1,531). Dr. RYMER, Medical Superintendent, records the discharge of 183 patients bacteriologically negative and free from any signs of external lesions. He observes, however, that the discharged patients were suffering from mild or early forms of the disease on admission, that the proportion of mild to total cases now admitted is smaller than formerly, and that there will be a steadily increasing tendency of permanent inmates to swell the numbers of advanced incurable cases. Much time and thought have been devoted to experiment and research with a view to improving methods of treatment, and several new possibilities in this direction have been explored, with the result that routine treatment of the disease stands on a more satisfactory basis than formerly. The majority of patients receive intramuscular or subcutaneous injections of ethyl esters of *Hydrocynus nigriceps* oil. Under this treatment 79 per cent. of patients improved, 13 per cent. showed no change and the condition of 8 per cent. became worse. Then ninety cases were selected who had either become worse on esters or had for some reason found such treatment unsuitable. They were again given esters, a special examination preceding each injection followed by (a) injected doses to suit the varying conditions of individual patients, (b) drastic reduction of dosage on the appearance of any sign of temporary instability of health. In 15 of these cases intravenous injections of fluorescein alternated with the injections of esters. At the end of the year 75 per cent. of the ninety cases had definitely improved, the remainder either showed no change or had become worse. The experiment appears to demonstrate that the most successful results from treatment with esters are largely dependent upon careful examination of each patient and continuous and accurate dosage and that the efficacy of mass treatments is open to doubt.

Other attempts to improve the quality of treatment with esters included interval treatments with fluorescein or phthalic acid. 310 cases were so treated and 84 per cent showed improvement.

The Leper Asylum at Kuala Lumpur continues to be reserved for chronic incurable cases. There were 330 (373) patients at the beginning and 286 (330) at the end of the year. The 37 Malay patients formerly housed at the Palau Pangkor Laut Settlement were transferred to Sungai Buloh during the year.

Venereal Diseases.—Cases treated at Government hospitals and clinics continue to decrease. Hospital in patient cases numbered 3,673 (4,002) with 101 deaths. Total cases treated at all centres numbered 19,704 (23,178) of which 11,403 were syphilis and 6,572 gonorrhoea. Chinese cases constituted 44.2 per cent. Tamils 34.7 per cent. and Malays 13.4 per cent. of the total cases treated. The factors contributing to the declining incidence were discussed in the previous issue (see this *Bulletin* 1935 Supp. p. 153*).

Other Diseases.—Mention has already been made of the increase in the recorded cases of beri-beri. There were 1,127 hospital cases recorded as "anaemia" with no indication of other pathological condition. Many of these may have been suffering from malaria, syphilis, helminthiasis etc. With regard to the latter it may be noted that laboratory examinations of faecal specimens totalled 145,396 and of these 32,055 were positive for ova, with ascariasis 65.6 (63.7) per cent., hookworm 25.6 (23.3) per cent. and mixed infections 8.8 per cent. Special clinics for diseases of the eye functioned at hospitals in all four States, the total number of patients treated being 9,491 (10,788) and of this total 1,313 (1,664) were in patient and 8,168 (9,124) out patient new cases.

Scientific.—Some mention has already been made of the important researches concerning problems affecting the health of Malaya carried out at the Institute for Medical Research (e.g. under *Maternity and Child Welfare*, *Malaria*, *Diphtheria*, *Enteric Fever*, *Tropical Typhus* etc.). It remains to say that despite the exercise of stringent economies imposed by financial considerations the established high standard of work was fully maintained. Routine examinations occupied a large part of the time of laboratory staffs. Particular attention was directed towards diphtheria and researches on tropical typhus, Japanese river fever and malaria (see above). With regard to the latter disease, during the course of investigations on the use of atebrin on rubber estates *A. separatus* was recorded as a local carrier for the first time. Full details of the work of the Institute are published in a separate report obtainable from the F.M.S. Government Press, Kuala Lumpur (See this *Bulletin* 1936 Vol. 33 p. 460).

Financial.—Total expenditure of the Medical and Health Department amounted to \$3,672,860 (\$3,957,933) or expressed in terms of sterling £428,500 (£461,758). This sum represents 6.2 per cent. of the total Revenue or 7.8 per cent. of the total expenditure of the Federated Malay States. In addition to the foregoing expenditure the Public Works Department expended \$53,672, or £6,261 on buildings, upkeep, repairs etc., while a sum of \$400,267 (\$388,106) or £46,697 (£45,278) from Sanitary Boards and other Government funds was spent upon anti-malarial works.

STRAITS SETTLEMENTS (1934).

The colony of the Straits Settlements, the collective name given to the Crown Colonies formed by the British possessions on or adjacent to the mainland of the Malay peninsula, as opposed to the Federated and Unfederated Malay States, consist of the island of Singapore with about a score of small islets lying in its immediate vicinity the town and territory of Malacca, the islands and territory of the Dindings, the island of Penang and Province Wellesley. The total area is about 1,248 square miles (Singapore 206 square miles Penang Province Wellesley and Dindings, 331 square miles Malacca, 639 square miles)

General—With regard to general administrative matters the Report observes. The process of decentralisation, so far as it affects the distribution of the Malayan Medical Service, may now be said to have reached completion. The Medical Officers and Health Officers of the Malayan Medical Service are now interchangeable between the Straits Settlements and the Federated Malay States and this development of the new policy is proving advantageous not only from an administrative point of view but also from that of the officers who were previously restricted mainly to service in the Straits Settlements. All higher and superscale appointments in the Straits Settlements and the Federated Malay States are now open on equal terms to officers of the Malayan Medical Service wherever serving.

Local Statistics.—The estimated population figures for the year under review showing territorial and racial distribution, may conveniently be set out as follows—

	Singapore	Penang	Malacca	Labuan	Total
Europeans	8,293	1,625	329	23	10,227
East Asians	7,148	2,413	2,093	33	11,684
Malayans	68,137	121,916	101,047	5,054	296,144
Chinese	390,948	162,878	61,433	2,171	617,420
Indians	42,223	47,962	19,533	142	100,892
Others	8,474	2,468	847	69	11,888
	525,228	339,297	185,001	7,497	1,057,106

Registered births totalled 42,874 (42,538) giving a crude birth rate of 40.7 (40.6) per 1,000. During the past decade the natality trend has been steadily upward, probably due to the steadily increasing ratio of women to men at the reproductive ages. The highest birth-rate was recorded amongst the Chinese with 44.3 (43.2) per mille. Stillbirths numbered 588 (1,408) or 1.4 (3.3) per cent., of live births. Registered deaths are not stated but the crude death rate is recorded as 28.5 (24.2) per 1,000 so presumably some 28,056 (25,201) deaths occurred among a population of 1,057,106.

With regard to infant mortality actual deaths are not stated, but the infant mortality rate is given as 171.8 (188.0) per 1,000 live births. It is suggested that among the factors contributing to a high and increasing mortality rate among infants increased employment for mothers and substitution of artificial for breast feeding may play their part.

There was a resumption of the immigration of Indian labourers the estate labour force increasing from 23 001 in 1933 to 27 833 in 1934. Numbers of births deaths etc. among these people are not stated. [Many data formerly appearing in these reports are omitted from that under review.]

Maternity and Child Welfare Work—There are Government Maternity Hospitals at Singapore and Penang maternity blocks attached to the general hospitals at Singapore and Malacca and maternity wards or beds available at most of the Government district hospitals in the St Andrew's Mission Hospital Singapore and in the Kwong Wai Shiu Hospital Singapore the latter a charitable institution supported by the Chinese community. Deliveries at these institutions during the year totalled 6,367 (5 639). Details relating to Government hospitals were—

Centre	Admis-sions	Deliveries	Maternal deaths	Deaths per cent. of deliveries
Singapore				
Maternity Ward, General Hospital	1 460	1,302	24	1.84
Maternity Hospital Kandang Kerbau	2,826	2,579	37	1.43
Penang				
King Edward VII Maternity Hospital	1 643	1,480	25	1.69
Butterworth Hospital	43	37	4	10.81
Bukit Mertajam Hospital	30	30	1	3.33
Sungai Bakap Hospital	67	48	7	14.58
Lembar Hospital	77	56	1	1.79
Malacca				
General Hospital	215	202	8	3.96
Alor Gajah Hospital	68	41	2	4.88
Jamu Hospital	68	62	1	1.61
Grand total	6 495	5,837	110	1.83

The rapidly increasing popularity of the free maternity hospital, Kandang Kerbau Singapore rendered extension necessary and during the year a new four-storey block was completed and occupied.

Regular courses of training for nurses and Asiatic midwives are provided at Government maternity hospitals while a number are also trained at the St. Andrew's Mission Hospital, Singapore. There are now 1,365 registered midwives in the Colony—viz. 273 Class A 711 Class B and 381 Class C. The numbers of Class C midwives are gradually diminishing and being replaced by Class B.

Infant and Child Welfare Services continue to be conducted as previously described (see this *Bulletin* 1935 Supp p 155*). At the three Singapore Municipal Clinics 14,258 (14 190) new infants or 82.3 per cent. of the total births were registered, attendances totalled 42,247 (49,237) and the District Sister and Staff Nurses paid 19,946 home visits 15,491 (14,666) of these being to newly born babies. Attendances at the Clinics and Crèches of the Singapore Child Welfare Com-

Society numbered 49,230 (55,854). Government maintains 16 Infant Welfare Centres and two sub-centres provide service in rural areas. The success achieved with such services has proved so encouraging that it has been decided to expand these important activities to two additional centres in Malacca and one in Province Wellesley.

In addition to the above, associated activities embrace a number of Government dispensaries for women and children, each in charge of a lady Medical Officer in the large towns. New patients at such centres totalled 44,723 (45,071), among whom were 20,423 (21,527) children. Motor travelling dispensaries also recorded 106,747 (123,179) attendances and of these 18,764 (18,606) were women and 39,642 (30,333) were children.

School Hygiene etc.—Singapore possesses a whole-time lady Medical Officer for girls' and junior boys' schools, and a whole-time Assistant Medical Officer for boys' schools. Routine procedure includes periodical inspection of school premises, medical examination of every child and re-examination of any found defective. Vaccination and re-vaccination are performed when necessary. Dental caries was the chief defect found among those examined, and the proportion of children with carious teeth was higher than in 1933. Children requiring dental treatment are referred to registered dentists. All Malay girls and teachers were examined for worm infestations and appropriate treatment given where necessary. The hookworm figures show a welcome improvement 5.3 per cent. as compared with 14.2 per cent. in 1933. Other defects noted and treated were enlarged tonsils and adenoids, defective vision and eye affections. No case of malaria or enlarged spleen was met with among girls and only six cases of enlarged spleen among boys in Singapore schools—i.e. among 32,886 boys and 5,213 girls examined.

In Penang approximately 90 per cent. of the 11,169 children attending Malay Vernacular Schools and 8,604 children attending English schools were medically examined during the year. By comparison, children attending the Vernacular schools appear to have the advantage 50 per cent. of the children examined and attending English schools showed gross dental defects—11 per cent. ear, nose and throat affections, 9 per cent. skin infections as compared with 40 per cent., 8 per cent. and 8 per cent. respectively among Malay children. The Travelling Dispensaries pay regular visits to schools in rural areas in Penang and Province Wellesley.

In Malacca, the Deputy Health Officer or the Assistant Health Officer of the district inspects a given number of schools each month, and a special report is submitted on the sanitary condition of school premises.

Informal talks on hygiene etc. were given by inspecting Medical Officers during their visits to schools. A more intensive campaign of health education among school children is desirable if hygienic habits are to be soundly inculcated.

Labour Conditions.—There was a resumption of the immigration of Indian labourers, with the result that the labour force on estates increased from 23,061 in 1933 to 27,883 in 1934. There is much less movement of labourers from place to place than formerly and the tendency towards more permanent settlement of labourers and their families on estates makes sanitary control less difficult and assists

efforts made towards maintaining a general standard of health of estate populations. Pressure is being brought to bear towards improving housing and sanitary conditions previously postponed on grounds of financial stringency.

Public Health Sanitation etc—The satisfactory standard of public health of the Colony during the past few years was well maintained. A factor of importance during the period was undoubtedly the large exodus of Chinese and Indian labourers due to the trade depression for it is reasonable to assume the bulk of the leavers would be the old or physically less fit persons whose chances of employment in an over-stocked labour market were less favourable than those of younger and healthier men.

Organization of the Health Branch was discussed in previous issues of this Supplement (see this *Bulletin* 1934 Supp p 129* and 1935 Supp p. 157*) and brief reference has been made in this Summary to the new policy of decentralization recently completed (see under "General" above).

Anti-malarial measures throughout the Colony were maintained at a high level of efficiency despite the strict need for economy. In the main arrangements concerned with *Sewage and refuse disposal* remain as previously described (see this *Bulletin* 1935 Supp p 157*) but it is noted the number of private installations of water-carriage and septic tank systems for private residences in rural areas are steadily extending. The question of *water supplies* was discussed at some length in a previous issue (see this *Bulletin* 1935 Supp p 158*) Owing to pollution of the Malacca supplies especially during the rainy season, the Municipal Commissioners have secured a loan for the installation of a high pressure filtration plant.

With regard to *housing* in Singapore the Improvement Trust takes necessary action for dealing with conditions of overcrowding and in Penang amelioration has been effected by action taken under the Municipal Ordinances. The Health Department makes free use of its powers for dealing with insanitary conditions. In rural areas many *village planning schemes* have been evolved to ensure suitable layout of buildings. Detailed surveys of many villages were carried out during the year and steps taken to amend insanitary conditions noted.

All premises engaged in the manufacture or sale of *foods and drinks* were regularly inspected and reported upon. Persistent endeavours are directed towards the improvement of milk supplies in rural areas. Samples of milk, various beverages and foodstuffs both local and imported, are regularly analysed and action taken when necessary.

Every opportunity is taken by the personnel of the Health Branch to spread knowledge of *hygiene and sanitation*. Lectures and film demonstrations are arranged and suitable posters displayed and explained.

Training of Sanitary Personnel—Courses of training are available for candidates wishing to present themselves for examination by the Royal Sanitary Institute London. During the year under review 15 private and 9 Government student sanitary inspectors attended the course and 7 presented themselves for re-examination. Of these candidates 27 were successful in obtaining the certificate of the Royal Sanitary Institute.

Sanitary Control of Aerial Navigation—The rapid expansion of aerial traffic through Singapore has necessitated action to provide for the application of the sanitary control measures prescribed under the Quarantine and Prevention of Disease Ordinance. As a temporary measure a part time Assistant Medical Officer is detailed for the examination of passengers and aircraft arriving at Seletar but a whole-time Officer with adequate assistants and convenient quarters, will be required.

Hospitals Dispensaries Clinical Returns etc.—During the year a new General Hospital of 573 beds was completed and opened in Malacca. Good progress was made with the reconstruction of the General Hospital, Penang two large five-storey blocks being completed and occupied. A new four-storey addition to the Free Maternity Hospital, Bandang Kerbau, Singapore, was completed and occupied, as stated above and the accommodation of the Mental Hospital, Singapore increased by the construction of four new wards.

In patients at Government hospitals numbered 55,768 (50,206), and 5,230 (4,530) hospital deaths were recorded. Distribution of patients and deaths throughout the Settlements was as follows: Singapore 29,090 patients, 2,850 deaths; Penang 19,583 patients, 1,684 deaths; Malacca, 6,897 patients 603 deaths; and Labuan, 193 patients and 13 deaths.

Out-patient cases totalled 296,098 (293,115) these figures excluding patients treated at Infant Welfare Centres, Special Clinics, School Medical Inspections etc. Out-patients at hospitals numbered 84,294 (29,492) at dispensaries 123,153 (171,943) and at travelling dispensaries 88,651 (91,680).

Principal diseases treated among hospital patients were Malaria, 5,961 admissions 271 deaths; venereal diseases 3,147 with 174 deaths; pulmonary tuberculosis 2,544 with 977 deaths; dysentery, diarrhoea and enteritis 2,030 with 393 deaths; and beri-beri 1,198 cases, with 321 deaths.

Malaria—All the 5,961 (5,349) cases admitted to Government hospitals and diagnosed as malaria were confirmed by microscopical examination. The number of such cases and deaths is, therefore, a more reliable index than are cases and deaths reported outside Government institutions. [For example total deaths due to malaria in the Colony were returned as 814 as compared with 1,747 in 1933 but on the other hand, deaths ascribed to "Fever unspecified" numbered 4,503 as against 2,821 in 1933.] There is reason to believe that hospital and Colony figures for 1933 represented a low-level experience in the periodicity of manifestations of malaria, and that the country is now entering a period of increased intensity of infection. The predominating type among hospital cases was subtertian infection—viz. subtertian 62.2 per cent., benign tertian 34 per cent., quartan 2.4 per cent. and mixed infections 1.4 per cent.

An outbreak in Province Wellesley was traced to an unusual vector in *A. barbirostris* an anopheline not hitherto regarded as a dangerous carrier in Malaya. [In this connection see also under "Malaria" in the Federated Malay States in this issue.]

Four cases of Blackwater fever were recorded, one of which proved fatal.

There was a marked decrease in the numbers of hospital patients treated for *enteric fever* 245 (330) and hospital deaths 68 (96) though deaths in the Colony registered as due to this cause were returned as 195 as against 122 in the previous year. The majority of the cases occurred in the large towns 120 (255) being notified in Singapore. Many cases occurred among school children the source of infection almost invariably being the food hawkers operating in the vicinity of schools. Hospital cases treated for *dysentery* totalled 724 (671) and hospital deaths 168 (136). Of these cases 60 were undefined and of the remainder 53 (45) per cent were bacillary 45 5 (52) per cent were amoebic and 1 5 (3) per cent. mixed infection. Total deaths in the Colony from dysentery were 442, as compared with 473 in 1933 [Here mention might be made of the fact that 1 364 (824) cases were treated in hospitals for *diarrhoea and enteritis* with 225 (130) deaths and that total deaths in the Colony under this title amounted to 1 469 (1,364)].

Diphtheria was responsible for 76 (76) deaths in the Colony during the year. The majority of cases were notified in the large towns in Singapore there were 254 (244) such notifications during the year. Hospital cases totalled 44 with 20 deaths. One fatal case of *smallpox* was recorded. Among the 6 cases treated in hospitals no deaths occurred. In one section of the Report it is observed "Ten cases of *cerebrospinal fever* were recorded of which eight died but the Hospital Returns say 13 cases were admitted and 4 proved fatal. Hospital cases of *typhus* numbered 14 but no deaths were recorded as due to this cause either in hospitals or in the Colony. No case of *plague* or of *cholera* occurred during the year under review.

Tuberculosis (all forms) constitutes a major public health problem registered deaths in the Colony numbering 2,276 (2 169) and of these 1,253 (1 189) occurred in the city of Singapore. Hospital in patients numbered 2,904 (2 413) and 979 (845) of them died. Of the total treated 2 619 (2,106) or 90 (87 2) per cent were pulmonary cases and in this group 881 (743) deaths were recorded. Hospital admissions for pulmonary tuberculosis were 2,303 as compared with 1 850 in 1933. Although facilities for modern medical and surgical treatment of the disease are available throughout the Colony there persists on the part of the majority of the poorer classes a reluctance to enter hospital until driven to take this step when the disease has reached an advanced and hopeless stage. The disease is compulsorily notifiable and medical practitioners receive a fee of two dollars for each case notified yet the numbers of such notifications are small as practitioners show a reluctance to report their cases. Special attention is devoted to education improvement of housing and special measures of sanitation with a view to controlling and limiting the spread of the infection. 1 482 cases of *lobar and broncho-pneumonia* were treated in Government hospitals and of these 813 were fatal. Of the total treated 1 429 (1 186) were admitted during the year under review 732 (536) being cases of lobar pneumonia.

Leprosy—The problem of providing additional accommodation for the increasing numbers of lepers seeking admission to the Leper Settlements in recent years has demanded and received the serious consideration of Government. If all cases admitted were in an early stage of the disease the possibility of cure would to some extent

mitigate the difficulties of accommodation, which are a source of embarrassment to the responsible administration but this is far from being the case, and an ever increasing residue of advanced incurable cases is gradually accumulating. Of 234 lepers admitted to the Pulau Jerejak Settlement 63 per cent. were advanced and only 15 per cent. in the early stages of the disease. To relieve congestion at the Pulau Jerejak Settlement a sum of \$150 000 provides for the construction of quarters for the accommodation of an additional 225 patients. The question of further expansion is being considered.

The problem of leprosy in Malaya differs in an important respect from that of most other countries in that it concerns chiefly the Chinese many of whom are immigrants probably bringing the disease with them. These previously infected, but not yet actively leprous cases provide Malaya's problem. Of 968 inmates at Pulau Jerejak Settlement 83 per cent. were Chinese, 13 per cent. Indians and only 3 per cent. were Malays. Leprosy occurring among Indians is of a comparatively mild type, and responds to treatment readily and with satisfactory results.

New cases admitted to Government Settlements during the year totalled 422 (388) and of these 234 to the Pulau Jerejak Settlement. (In the returns of diseases and deaths for the Colony it is stated that 592 cases of leprosy were admitted to Government institutions during the year.)

(The Report provides detailed descriptions of various aspects of the work carried out at the Pulau Jerejak Settlement but little is said of the activities at other centres.) Treatment continues on the lines previously described (see this *Bulletin* 1935 Supp. pp. 160* 162*)

Venerel Diseases—In addition to the facilities provided for the treatment at all hospitals and out-patient dispensaries, and the special sessions held for women at the Women's and Children's Dispensaries in Singapore and Penang there are three special V.D. Clinics for males in Singapore and two in Penang. The decline in the number of new cases presenting themselves for treatment has been steadily progressive during the past five years. In 1934 there were 21 432 (23,256) new cases and of these 52·6 per cent. were Chinese 29·1 per cent. Indians and 13·7 per cent. Malays. The classification of cases as presented in the preceding Annual Report is omitted from the issue under review (see this *Bulletin* 1935 Supp. p. 162*). Hospital returns record total in patient cases treated 3,394 (3,594) and of these 1,884 (2,180) were syphilitic cases, 1,075 (1,068) were suffering from gonorrhoea, 296 (257) from soft chancre, 129 (106) from tropical bubo and 1 (3) from granuloma venereum.

Other Diseases calling for brief mention are the following—

There were 1,196 hospital admissions for beri-beri during the year as compared with 888 in 1933 and 321 (203) hospital deaths were ascribed to this cause. Total deaths due to the disease in the Colony as a whole were 913 (721) a figure which is almost the same as for 1931—viz. 911. The increase is attributed to more prosperous conditions, increased purchasing power of the people and increased expenditure upon more sophisticated foods. [A similar experience was recorded in the Federated Malay States (q.v.)] There were 500 (516) in-patient cancer cases, with 151 (165) deaths.

The *anacras* were responsible for 283 (236) hospital admissions with 37 deaths while of 3,296 (4,266) cases for afflictions produced by external causes 683 (592) were for injuries caused by motor vehicles and of these 64 (33) proved fatal.

Scientific—At the Singapore Laboratory the Pathological Division examined 9,025 (8,373) specimens comprising 8,205 (7,538) sera for complement fixation and Kahn tests for syphilis, and 812 pieces of tissue for histological examination. Autopsies performed totalled 1,573 (1,470) and of these 1,200 (1,049) were at the Tan Tock Seng Hospital, where the main causes of death so ascertained were Pulmonary tuberculosis 23·9 (24·3) per cent beri beri 6·3 (4·5) per cent syphilis 6·0 (5·8) per cent malaria 4·2 (3·4) per cent. The work of the Bacteriological Division included cultural examinations serological tests, the preparation of autogenous and prophylactic vaccines the examination of medico-legal and public health exhibits etc. 4,178 (4,503) specimens were examined during the year.

At the Penang Laboratory the more important examinations included 7,492 (6,362) Wassermann and 7,772 (2,498) Kahn tests. At the Malacca Laboratory better facilities afforded by the new laboratory enabled a larger amount of work to be undertaken total specimens examined increasing from 19,521 in 1933 to 21,931 in 1934. The total included 3,337 (1,091) Kahn tests and 3,337 (4,581) specimens of urine.

King Edward VII College of Medicine—Extracts from the Report of the Acting Principal of the College are presented. The full curriculum of medical and dental courses was maintained. There was an entry of 18 (17) medical and 17 (20) dental students at the commencement of the academic year. In December 1934 there were 155 (151) students including 49 dental students.

In January 1934 Sir Richard NEEDHAM visited the College as Inspector of the General Medical Council on the invitation of the Council to the G.M.C. His comments may be regarded as highly satisfactory and most of his recommendations have been, or are in process of being adopted.

During his leave the Professor of Bacteriology visited museums in the East in Canada, America, Copenhagen and in Berlin, in order to study modern museum methods with a view to their adoption in the Health Museum at the College.

The first International Malaria Course for the Far East was held at the College under the auspices of the League of Nations the course comprising theoretical and laboratory studies combined with field demonstrations. Twenty-seven delegates attended the course.

Financial—Actual expenditure on medical and health services amounted to \$3,357 112 (\$3,524,835) distribution of this expenditure being Singapore, \$1,977,916 (\$2,241,610) Penang \$979,371 (\$924,460) Malacca \$377,754 (\$335,290) and Labuan \$22,071 (\$23,475). In addition to the above Municipal Health Services spent a total of \$893,710 (\$1,007,320) of which sum Singapore spent \$697,015 (\$715,000) Penang \$152,413 (\$248,394) and Malacca \$44,281 (\$43,926).

Penang Straits Settlements.

HEALTH OFFICER'S REPORT FOR 1934.

Vital Statistics.—The estimated mid year population, calculated after the method adopted by the Registrar-General Straits Settlements, was 159 085 (156 014) composed of Europeans 1,296 (1,271) Eurasians 1,806 (1,771) Chinese 109 074 (108 869) Malays 21 017 (20 611), Indians 24,351 (23,881) and others 1,541 (1,511). It will be seen that the Chinese element comprises no less than 69 per cent. (68.5) of the total population of Penang Municipality the remaining section of the community contributing Indians 15 per cent. (15.3) Malays 13 per cent. (13.2) Europeans Eurasians and others each 1 per cent.

The registration system, which is simple and works well, calls for the declaration of births within fourteen days and deaths within twelve hours. Delayed registration of a death may be effected within three days on payment of a fee. [For other details of registration see this Bulletin 1935 Supp p 168*] The data resulting from the functioning of this service were as follows —

Births — 4,977 (5 052) with a crude rate of 31.23 (32.4) per 1 000. The racial contributions and rates were European 39 (32) or 30.1 (25.2) Eurasians 39 (52) or 21.6 (29.3) Chinese 3 656 (3 655) or 33.3 (34.2) Malays 508 (537) or 21.1 (23.5) Indians 709 (709) or 29.1 (29.7) and others 26 (17) or 16.8 (11.2). Total births registered during 1934 were slightly below the decennial average 5 003. Chinese and Indians births for the year under review were in excess of the decennial averages for these two population groups but in all other cases the annual figures were below the average for the ten-yearly period.

Deaths — 3,935 (3,592) with a crude rate of 24.73 (23.0) per 1 000. Of the total deaths recorded, 443 related to deceased persons not normally resident in Penang, and who had been less than three months within the municipal limits. Correcting for non-residents, the deaths become 3 492 (3 172) and the rate 21.95 (20.3). The distribution of deaths by race and the specific rates for each of the racial elements read as follows —

Europeans 2 (6) or 1.54 (4.0) Eurasians 26 (27) or 14.4 (15.2) Chinese 2,385 (2,202) or 21.9 (20.6) Malays 564 (485) or 26.8 (23.5) Indians 485 (430) or 18.9 (16.0) and others 30 (22) or 19.5 (14.5). It will be noted that with the exception of the European and Eurasian death-rates all others exceed the corresponding rates for 1933. Average deaths (corrected for non residents) for the decennium numbered 3,404, and the average rate for the same period 23.90 as against 3,492 and 21.95 for 1934. A study of the distribution of mortality by months of occurrence suggests that during the season, October to January mortality is higher and virtually determines the death rate for the year.

Infant Mortality — Deaths under one year numbered 777 (737) or 158 (146) per 1 000 live births. Of the total infant deaths recorded, 141 occurred within the first week of life 232 (226) occurred within one month of birth, and 236 (224) between one and three months. Average infant deaths for the preceding ten years numbered 736, with an average rate of 147 per 1 000. Every effort is made to ensure that Health Sisters may visit mothers and babies with the least possible delay after a birth has occurred, so that expert attention and advice

can be given should these services be required. Health Sisters are provided with daily reports of all notifications received and take immediate action to visit cases.

Maternity and Child Welfare—The organization of services has previously been described (see this *Bulletin* 1935 Supp p 166*) The total number of visits made by Health Sisters and Nurses was 54,941 compared with 54,538 similar visits in 1933. At the end of the year midwives in the municipal area registered under the Midwives Ordinance 1923 numbered 326 of which 72 were Class A 240 Class B and 14 Class C these classes being described as follows. Class A includes those who after a twelve months course of practical and theoretical training in midwifery obtain the *Diploma* granted under the Midwives Ordinance. Class B are those who after a non-specified period of practice in midwifery gain the *Certificate* under the Midwives Ordinance. Class C includes local bidans or unqualified midwives who were registered after the Central Midwives Board (S.S.) had certified they possessed a competent knowledge of midwifery.

General Hygiene and Sanitation—There is little to add to former accounts which have described various activities concerned with schemes of work directed towards the improvement of the general hygiene and sanitation of the Municipality. Permanent anti-malarial works included the completion of the subsoil drainage scheme at Batu Gantong, and the construction of a cement concrete drain in the Brook Road area. A reorganization of the Indian labour force contributed to greater efficiency but the work undertaken by this force was the same as in former years (see this *Bulletin* 1935 Supp p 166*). Anti-mosquito work continued to receive the careful attention of the Health Department. As a result of heavy rainfall during the year oiling-gangs were kept exceptionally busy and constant supervision of the work was called for to guard against the establishment of new breeding sites. Following reference to types of anophelines most commonly met with the Report observes. Complaints received about mosquitoes were practically always due to *Aedes argenteus* and less frequently to other types of culicines.

Malaria was responsible for 26 (51) deaths during the year the average deaths due to this cause during the past ten years being 97. In this connection it is claimed that for some years practically no malaria has been contracted within the Municipal boundaries but that human receptors have become infected when visiting malarious areas outside Municipal limits. Following the investigation of 19 deaths due to malaria it was shown that all cases but one gave histories of having contracted the fever outside Penang. It may be of interest to call attention to the fact that during the year 507 (523) deaths were ascribed to Unspecified Fever a term used since 1921 in cases where available information as to the cause of death does not appear to warrant a more precise diagnosis. Under this title during the past decade deaths have had an annual average of 553. It should be noted also that of the total deaths of residents recorded, 3,592 less than half of the cases received medical treatment prior to death. In these circumstances since the number of post mortems carried out was so small as to be negligible causes tabulated must be accepted with reserve.

Tuberculosis.—This disease remains a serious cause of sickness and death. There was a definite increase in the number of deaths 293, as compared with 253 in 1933 while of the total deaths recorded no less than 276 (232) were assigned to Pulmonary Tuberculosis. The distribution of the pulmonary deaths by race reads Chinese 200 Indians 47 Malays 23 Eurasians 3 others 3 Europeans 0 but these absolute figures should be considered in connection with the specific mortality rates which were Indians 1.9 per 1,000 Others 1.9 Chinese 1.8 Eurasians 1.6 and Malays 1.1. It is possible that the returns under Unspecified Fever (see above) vitiate the tuberculosis records though to what extent is not known. Apart from the evils of overcrowding lack of ventilation etc., if and when the advice of a qualified medical practitioner is sought in too many cases this occurs after the harmful treatment prescribed by unqualified native doctors has reduced the patient to a stage beyond human aid. Education in health matters one of the principal objects aimed at by the Health Department will it is hoped, ultimately bear fruit and bring about a reduction in the unnecessary waste of human life.

Respiratory Diseases (excluding tuberculosis) exact a heavy toll in Penang as they so often do in tropical territories. A total of 730 (533) deaths was recorded, of which 175 (190) were assigned to bronchitis 155 (116) to pneumonia and 400 (227) to other respiratory affections. [The mortality experience due to pneumonia and bronchitis over the past decade has been characterized by somewhat erratic variations and it would be interesting and useful to know what rules of tabulation govern the classification of joint causes of death for example where primary influenza precedes pneumonia, or measles gives rise to bronchitis cases proving fatal which title receives preference for purposes of classification, and when were such selective rules introduced?]

Beri-beri was the cause of 114 (92) deaths during the year 100 of these deaths occurring among Chinese 9 among Malays, 4 among Indians and 1 Eurasian. Average annual deaths due to this cause over the past ten years number 27. It is noticed that during the past five years there has been a steady increase in the number of beri-beri deaths, the score reading 14 30 50 92 and 114.

Notifications of the principal infectious diseases totalled 553 (521) 133 patients and 43 contacts being admitted to the Infectious Diseases Hospital, Perak Road. Of the total notifications, chicken-pox was responsible for 161 (152) cases, 122 (128) of which were admitted to the Quarantine Camp. As usual Indians showed a distinct susceptibility to this disease, 102 (115) Indian cases being recorded. Epidemic fever was responsible for 37 (44) notifications and 16 (21) deaths, 28 cases were treated in hospital with 8 deaths, the remaining 11 cases, with 8 deaths, receiving treatment in their own homes. The distribution of fatal cases was Chinese 12, Malays 2 and Eurasians 2. Dr Atherton notifications and deaths were fewer 28 and 13 respectively compared with 46 and 15 in 1933. Separate cases are the rule and usually it is found impossible to trace the infection—a difficulty not unknown to workers amongst native populations. Of 13 fatal cases one was notified a week before death, the remaining 12 notifications being received almost coincidentally with receipt of the death certificates, indicating that medical aid was not sought until the last possible moment.

Though no case of plague has been recorded in recent years the special rat-catching gang continued their usual services destroying 6,901 (9,091) rats during the year. Smallpox was again absent from the morbidity and mortality records the work of vaccination ran smoothly throughout the year 3,643 vaccinations of which 3,178 were primary and 465 secondary were performed by Medical Department Staff 971 primary vaccinations were done by private practitioners and 3,304 secondary vaccinations mostly among school children, by Government vaccinators.

Financial—Total expenditure amounted to \$151,540 (\$148,591) this sum including cost of upkeep of the Quarantine Camp, Maternity and Child Welfare work, Vaccination and Anti Malaria Services.

MUNICIPALITY OF SINGAPORE (1934)

Vital Statistics—The mean annual population was estimated to be 484,963 comprising 6,907 Europeans 6,477 Eurasians 373,855 Chinese, 46,219 Malays 43,448 Indians and 8,057 persons of other races not included in the above groups.

Births during the year under review numbered 17,329 giving a crude birth rate of 35.73 per 1,000 as compared with the corresponding rate of 35.36 per 1,000 in 1933. Of the total births recorded no less than 13,846 representing 79.90 per cent of the total were Chinese.

Stillbirths numbered 473 (431) but in the absence of data relating to the numbers of single and married women at the reproductive ages it is not possible to compare stillbirth rates over a series of years.

10,162 deaths of persons at all ages were registered during the year the resulting crude death rate of 20.95 per 1,000 being slightly in excess of the corresponding rate for 1933 (19.66). If the 222 deaths occurring among persons resident for less than three months in Singapore are deducted from the total deaths recorded, the death rate for the year becomes 20.49 per 1,000. The highest mortality rate occurred among Malays 25.90 (23.89) and the lowest among Europeans 6.52 (6.92) the remaining rates being Chinese 21.13 (20.76) Eurasians 18.06 (12.99) Indians 17.95 (15.43) and others 15.76 (13.42). It will be noted that with the sole exception of the European mortality rate the rates for all other races exceed the corresponding rates for 1933. It would be of interest to know the causes responsible for the considerable increase in mortality among Eurasians. As regards Causes of death there was an unaccountable increase in the numbers of deaths ascribed to circulatory diseases whilst the increased deaths due to Infantile Convulsions and to Beri-beri are difficult to explain.

Infant Mortality—The death of infants under one year numbered 3,107 (2,980) and the infant mortality rate 179.3 per 1,000 live births (176.5). Analysis of the data shows that an increase of 21.7 per 1,000 in the deaths of Malay infants is responsible for the extra deaths recorded during the year. It should be noted also that the infant mortality rate for 1933 constituted a low record. Of the special investigation referred to in the earlier reports and undertaken to determine the responsibility of Syphilis in the infant mortality problem,

Dr HUNTER deplores the fact that owing to shortage of staff it was not possible to carry on this important work as extensively as he would have wished. 297 mothers of dead infants were serologically examined, of which 15.59 per cent gave positive reactions.

Supervision of Midwives and Infant Welfare—The District Staff paid a total of 22,601 visits to 14,591 mothers. Of these mothers 11,311 or 77.52 per cent. were reported to be living in cubicles or single rooms. For some reason mothers seem slow to take advantage of the free services of the qualified midwives attached to the Clinic, for it is noted that 3,792 mothers received no skilled attention at birth. The figure though large, shows a small but encouraging decrease when compared with the corresponding figures for 1933 (3,873). In the branch of work devoted to the supervision of midwives, the District Sister and Staff Nurses paid 19,946 visits during the year under review. Dr Muriel CLARK contributes a separate and comprehensive report which should be read in its entirety. 14,258 new babies were taken on the Clinic registers at the three centres; this figure represents 82.23 per cent. of the total births recorded in the Municipality during the year. There were 42,247 clinic consultations, a marked decrease from the 1933 figure (49,237). This decrease is due however to reorganization which has contributed materially to the furthering of the fundamental aims and objects of the Department concerned with the teaching of Mothercraft and Infant Welfare. Mothers who attended the Clinics had grown inclined to regard these centres as out-patient clinics, where they could secure medical and minor surgical treatment for themselves and their babies. The Lady Medical Officer took steps to rectify this erroneous impression, with the result that mothers and babies when sick now attend hospitals of their own accord for treatment thus relieving pressure upon Clinic Staffs who are now able to devote much more attention to individual cases attending the centres. The campaign against dirty feeding bottles has been vigorously continued—the numbers of tins of free milk distributed has declined by over 22 per cent., compared with the 1933 figure a decline attributed mainly to an increase in wholly or partly breast fed infants. Venereal disease continues to extract a heavy toll in sickness and the deaths of infants under one year and investigations similar to those carried out in previous years have continued. Careful attention has been devoted to the consideration of another factor—that of avitaminosis—in the hope that by giving advice to pregnant women in particular and by combining advice with the exhibition of preparations rich in the essential vitamins, further diminution in the loss of pre-natal and neo-natal life might follow.

Clinical—The number of admissions to the Middleton Hospital for Infectious Diseases, 930 constitutes a record. Cases of *chickenpox* numbered 398, of *diphtheria* 152, and of *mumps* 149. Among the diphtheria cases 41 deaths were recorded, 24 of these occurring within 24 hours of admission. 53 of the total diphtheria cases were laryngeal in type 35 of which required immediate tracheotomy. These figures demonstrate the persistence of a regrettable tendency on the part of parents to regard this affection too lightly.

Epidemic—120 cases (4 paratyphoid) were notified during the year the yearly average for the previous decade being 196.3 cases. 62 deaths were ascribed to this cause. Of 7 cases notified, resulting in 3 deaths,

all related to children living in adjoining streets it is practically certain that the common source of infection must have been a "carner" itinerant hawker of some form of sweetmeat or ice-cream 286 dysentery deaths were recorded during the year of which 131 were so certified by Inspecting Officers on a view only a fact which suggests that many of the dysentery deaths may really have been typhoid deaths Dr HUNTER comments strongly upon the lax way in which food is allowed to be handled, and pleads for stricter control, especially over hawkers. There were 960 notifications of tuberculosis of which 713 were Chinese 141 Indians and 75 Malays total deaths due to the same cause numbered 1,253 254 (244) cases of diphtheria were notified during the year with 58 deaths 50 of these occurring among Chinese. Comparisons with former years are difficult for the earlier small numbers were probably grossly inaccurate—not in any way representative of the true incidence of the disease but merely reported as too ill to be concealed. A striking feature is the frequency with which laryngeal cases appear to occur Contacts of all those notified are swabbed in an endeavour to bring children infected by the original case under treatment as soon as possible and before the disease has progressed too far At the Bacteriological Laboratory 4,057 throat swabs were examined from 878 of which *C. diphtheriae* was isolated.

Having regard to its situation, mixed population and world wide trade Singapore has been remarkably free from the great epidemic diseases Smallpox Cholera and Plague during the past few years. Not a single case of cholera has been recorded for six years despite constant communication with ports in which the disease has been endemic and epidemic. Only a single isolated case (in 1933) of plague has occurred in the past five years, this freedom being ascribed to improvements in building construction the rapid removal and disposal of rubbish and to the organized destruction of rats. One case of smallpox of the haemorrhagic variety in an elderly Chinese woman, was notified. Since security against smallpox depends first upon a well vaccinated population protected by vaccination in infancy and re vaccination in adult life these matters have received the special attention of the Health authorities resulting in great improvement in the vaccination figures in recent years. There were 14,362 vaccinations reported during 1934 11,521 of these were performed by the Municipal Vaccinators 99 per cent. of those seen for the second time were found to have been successful.

The Report of the Deputy Health Officer Dr DAWSON describes in detail the anti mosquito activities during the year involving an expenditure of 57,387 dollars (52,018). No new areas were opened up but permanent drainage and extension of existing works were carried out in a number of areas. Systematic surveys of the Municipal area were regularly carried out and 1,112 collections of mosquito larvae were examined and identified in the laboratory Mosquito larvae were found in 7,347 houses and compounds i.e. in 17.25 per cent. of the houses visited by Sanitary Inspectors. In connection with anti mosquito work, Dr HUNTER recommends the permanent filling of an area of swampy ground which is at present a potential source of danger in that a good deal of *A. ludlowi* breeding occurs there. The reclamation of ground in close proximity to the new aerodrome site would

result in the creation of valuable building sites and would not only remove for all time the danger of malaria amongst the inhabitants of a very wide area but would prove of first-rate sanitary importance in the future in the event of the aerodrome being declared the first port of entry into the country of all aeroplanes from "infected" countries, especially from those infected with yellow fever.

In addition to the usual analyses of samples of water, sewage, foods, drinks, etc., the staff of the Municipal Chemical Laboratory were engaged in certain special investigations during the year. These included a series of tests at the Pulai filter house and in the laboratory with a view to obtaining a more efficient flocculation of the raw water before filtration, the study of the filtration rates of the effluent from the sedimentation tanks of the bio-flocculation unit and various experiments concerned with the digestion of sludge from these tanks, the treatment of crude night soil, and so on.

The report of the Bacteriological Laboratory should be read in full (as indeed should all the separate reports appended to the General Report of the Health Department) if readers are to appreciate the scope and amount of work accomplished during the year and its first rate importance from the public health point of view. 4,475 blood films (an increase of 552 on the previous year's record) were received for examination malaria parasites being found in 598 or 13.4 per cent of the total. Of these, 315 or 52.7 per cent. were benign tertian infections 48.2 per cent. subtertian 5 only were quartan while 2 were mixed subtertian and benign infections. Of 1,413 specimens of sputum submitted tubercle bacillus was found in 270 cases. 536 agglutination tests were applied 33 samples of serum being found positive with *Bac. typhosus* while upwards of 1,300 faecal specimens were examined for *E. histolytica*. Brief mention has already been made of freedom from plague. In this connection it may be added that 3,738 rats were dissected in the laboratory but none found infected with plague nor were any of the specimens of human origin received during the year. Other routine activities included the examination of 40 specimens of cerebrospinal fluid the meningococcus being found in 17 cases the examination of 4,057 specimens of diphtheria material and the demonstration of *Mycob. leprae* in 15 out of 52 specimens of leprosy material. 1,833 blood samples were submitted to Wassermann tests when the Kahn reaction test was also applied to 1,785 of these specimens the results were found to agree in 98 per cent of all cases of which 236 were positive and 1,504 negative. 7,321 routine samples of water were analysed and the results found to be satisfactory.

Food and Markets.—The total quantity of foodstuffs passing through the markets was rather less than usual. Work concerned with the repair and upkeep of the Municipal markets and the inspection of foodstuffs exposed for sale has continued with characteristic vigour and thoroughness. No less than 78,945 catties of unsound foodstuffs, mostly fish were seized and destroyed in the Incinerator. 13,443 cases tins, etc. of unsound foodstuffs were surrendered by their owners and destroyed. It was found in nearly all cases of dried green peas from China that copper compounds were present in excess of what is allowed by the regulations.

MALAY STATES NOT INCLUDED IN THE FEDERATION

Johore (1934)

The State of Johore lies at the southern extremity of the Malay Peninsula to the north is Pahang to the north west Negri Sembilan and Malacca, on the west the Straits of Malacca on the south the Strait north of Singapore, and on the east the China Sea. The area of the State is about 7,320 square miles almost exactly that of Wales.

General.—The last issue of this Supplement provided a Summary description of the Health organization of the State of Johore (see this Bulletin 1935 Supp pp 171*-172*) Such slight changes of personnel as were introduced in 1934 do not affect the fundamental organization as formerly described, and repetition is unnecessary.

Total Statistics.—In order that data shall be more comparable with data relating to other States in Malaya the geometric method of population estimation hitherto used has been replaced by the method used by the Director-General of Statistics Malaya. Population and rates have therefore been recalculated for 1933 and results will not agree with figures quoted in the last issue of this Supplement (q.v.).

Estimated population for the year under review was 499,370 (487,924) the racial distribution being Malaysians 249,982 (246,805) Chinese 201,205 (195,720) Indians 43,273 (40,714) Europeans 736 (672) Eurasians 318 (308) and Others 3,856 (3,705).

Total registered births were 29,559 (20,181) and deaths 12,850 (9,741) the resulting birth and death rates being 41.2 (41.4) and 25.7 (20.0) per mille respectively. Rates per 1,000 according to race and in descending order of magnitude were for births Malaysians 44.9 Chinese 39.5 Indians 29.9 Others 24.1 Eurasians 22.0 and Europeans 5.4 and for deaths Malaysians 29.7 Chinese 22.5 Indians 19.0 Others 16.6 Eurasians 6.3 and Europeans 1.4.

Infant deaths numbered 4,697 (3,010) and the infant mortality rate 223.5 (149.2) per 1,000 live births. Infant mortality by racial groups does not appear to be presented but distribution by the seven districts shows the following infant mortality rates Kota Tinggi 298.0 (195.0) Kukup 286.6 (160.1) Endau 283.7 (168.2) Batu Pahat 232.4 (119.4) Muar 222.0 (163.1) Segamat 208.8 (155.2) and Johore Bahru 182.3 (142.5).

European Officials numbered 114 (117) none was invalidated, but 1 (0) death was registered. Of the 6,140 (5,900) Asiatic officials 13 (14) were invalidated and 6 (9) deaths were recorded.

Estate Populations.—The monthly average of labourers was 46,579 (38,815) making with their dependents 9,695 (8,420) a total of 56,274 (47,235) persons. Among these people 590 (470) deaths occurred, giving an annual death rate of 10.5 (10.0) per 1,000. A comprehensive statistical summary gives for each of the estates the numbers of cases and deaths according to a list of 13 causes and population and deaths with racial distribution. From this summary it is noted that 62,856 cases were treated and of this total 41,174 cases with 334 deaths were ascribed to other diseases. Among the rest "Fever unspecified" was responsible for 8,138 (5,454) cases with 14 (21) deaths malaria for 6,287 (6,996) cases with 71 deaths ankylostomiasis 1,643 (1,557) cases with 2 (0) deaths pneumonia 483 (413) cases and 103 (71) deaths and beri-beri 335 (218) cases and 22 (6) deaths.

Maternity and Child Welfare—[This section of the Report presents an abundance of tabular matters, but, valuable as this is, it is to be regretted the text interpreting the recorded facts is so meagre.] Twenty (23) probationer midwives were in training during the year and 12 (7) new midwives were granted certificates to practise. There are now 94 (83) certificated midwives practising in the State. Maternity cases admitted to Government hospitals numbered 1,535 (1,368) and 35 (35) maternal deaths were recorded. As 1,322 babies were born in hospital the maternal mortality rate was 28.5 (25.5) per 1,000 births—an unusually high figure. The clinics for women and children established at Johore Bahru and Muar continued to function, as previously described (see this *Bulletin* 1935 Supp. p. 173*) Ante-natal work is said to be growing increasingly popular. At these centres, 5,855 (6,674) new cases of infants and children were recorded, and total attendances were 13,423 (18,701). Expectant mothers (new cases) numbered 1,147 (1,277) and in addition 4,215 (3,453) other women were seen. A motor bus conveys patients to the clinics from surrounding kampongs; this transport service proves an inestimable boon to the poorer patients, 14,227 of whom were conveyed to and from the centres by this means.

School Hygiene—During the year 61 Government boys' schools and 12 girls' schools were medically inspected, and 8,153 (6,442) pupils were medically examined, the latter total comprising 7,215 boys and 918 girls. Sixteen private schools—practically all conducted by Chinese for Chinese pupils—were also visited, and recommendations submitted through the Protector of Chinese Johore for such sanitary improvements as were deemed necessary.

Among the total boy pupils medically examined, 5482 were Malay boys and of these 10.9 per cent showed defective teeth, 8.5 per cent enlarged tonsils and 4 per cent enlarged spleens. On the other hand, among Malay girls 57.5 per cent had dental defects, 24 per cent enlarged tonsils and only 0.7 per cent enlarged spleens. No comment upon these striking differences is supplied in the Report. At the school Dental Clinics 2,058 pupils were examined. 1,235 (or over 60) (81.7 per cent) required dental treatment and 986 cases were treated.

Public Health Sanitation etc—Under this heading appear general reviews of the work done in areas controlled by each of the Town Boards. These descriptions, which discuss such matters as drainage, scavenging, water supplies, anti-malaria measures, etc. differ in no fundamental particular from corresponding descriptions in previous reports the only items of additional information being the following:

- (a) In Johore Bahru methods of night-soil disposal by burying and trenching appear to have replaced the former sea-dumping practice.
- (b) The construction of the piped water supply system to Muar was completed, but as analyses of samples showed wide variations from day to day it was decided to install a chlorination plant before supplies are made available for public use.
- (c) Chlorination plants are also to be installed for Segamat and Kota Tinggi waters.

It remains to add that anti-malarial work continued along the usual lines, and that services concerned with the inspection of foods and drinks, etc. were conducted satisfactorily.

Hospitals Dispensaries Clinical Returns etc—Hospitals remain as previously described (see this *Bulletin* 1935 Supp. p. 173)—¹¹²

16 and 15 Government dispensaries. Hospital admissions totalled 27 753 (23 165) and cases treated during the year 29 487 (26 839) with 1,742 (1 457) hospital deaths. At the Government dispensaries 76 495 (70 721) new cases were treated and 133 108 (134 141) attendances recorded.

Malaria in-patient cases numbered 4,252 (4,597) or 14.4 (17.1) per cent. of all in-patient cases under treatment. These figures refer only to confirmed diagnosis and in addition there were 1,371 cases of malaria (unspecified) and 216 (111) of fever unspecified. Hospital deaths ascribed to malaria were 163 (confirmed) 24 (unspecified) and 6 due to fever unspecified. At Government hospitals and dispensaries 35,884 (31,490) blood films were examined 5,201 (4,437) or 14.5 (14.1) per cent. being positive for malaria parasites. Of these 56.5 (49) per cent. were *P. falciparum* (including those with gametocytes) *P. vivax* 30.3 (38.1) per cent. *P. malariae* 1.5 (3.4) per cent. and mixed infections 11.7 (9.5) per cent.

Of enteric fever 97 (134) cases with 28 (30) deaths were recorded—fewer cases but a higher case-fatality rate than in 1933—viz. 28.0 (22.4) per cent. Dysentery cases numbered 533 (498) with 88 (86) deaths. Diarrhoea and enteritis 230 (170) cases of which 6 (5) were fatal. In this connexion it may be noted that during the year under review total deaths in the State of Johore ascribed to dysentery were 105 (115) and to diarrhoea and enteritis 322 (177).

Pulmonary tuberculosis was responsible for 592 (504) deaths in the State, as a whole and of these 264 (247) occurred among the 675 (649) cases treated in Government hospitals. Pneumonia another serious cause of sickness and mortality claimed the lives of 674 (526) persons 658 (494) sufferers from this disease were treated as hospital in patients and of the total cases 259 (153) proved fatal. Phthisis and pneumonia are the most serious causes of mortality in the State.

Fewer cases of influenza were recorded 1,165 as compared with 1,319 in 1933. Total deaths due to this cause were 6 (2). 4 (2) of these occurring among hospital in patients. There was a slight increase in the number of cases of ankylostomiasis 1,547 as compared with 1,332 in the preceding year total deaths due to this cause being 23 (32) and 15 (33) of these occurred among hospital in patients.

Beriberi continues to be the most serious deficiency disease met with in the State and though there was only a 3 per cent. increase in the numbers of Government hospital cases treated mortality in the State as a whole was higher than in any year since 1929. Total deaths in the State due to this cause were 434 (196) Government hospital cases 577 (508) and hospital deaths 56 (42). There were also 335 (218) cases of the disease treated in estate hospitals with 22 (6) deaths and 1,489 (0) cases treated by travelling dispensaries. [The Report supplies no word of comment of these experiences].

Other diseases responsible for unusual morbidity and/or mortality which should be noted included *diseases of early infancy* which claimed 1,390 (1,019) deaths though during the year under review despite the fact that mortality under this title had increased by 36 per cent. only 152 cases were treated in Government and estate hospitals as compared with 1,377 such cases in 1933. [Here, again the reader is left to guess about these matters nothing more than the numerical statement appearing in the Report]. Again, deaths due to *diseases of*

pregnancy during the year under review 208 (186) show a 7 per cent increase, but hospital admissions were fewer—528 as compared with 1,363 in 1933. [Are the hospitals in the State becoming unpopular among expectant mothers?]

Venereal Diseases.—Cases treated in Government hospitals totalled 717 as against 807 in 1933. Total deaths in the State amounted to 34 (32) and of these 19 (23) occurred among hospital cases. Cases of venereal diseases showed a remarkable decline from 3,930 in 1933 to 455 in 1934. [The bare facts are merely stated in the Report no commentary in explanation of the cause or causes responsible for this favourable departure from average experience during the past five years being provided.]

Administration and accommodation at the Leprosy Asylum, Johore Bahru, remain as previously described (see this Bulletin 1935 Supp., p. 174*). At the end of 1933 there were 177 inmates, and during 1934 new admissions totalled 86 (78) so that cases under treatment during the year were 263 (280). 19 (12) deaths were recorded, 51 (53) patients absconded, 6 (2) were discharged, and 3 (6) transferred to the State Prison, Johore Bahru leaving 184 (177) on the books at the end of the year. No details of methods or results of treatments are supplied.

Scientific.—At the Laboratories of the General Hospitals, Johore Bahru and Muar bacteriological and pathological work included the examination of 22,104 (18,035) bloods 13,886 (11,035) faecal specimens, 3,600 (5,399) Wassermann and Kahn reactions 2,253 (2,429) Widal reactions and other agglutinations 2,898 (2,359) sputa and 5,226 (4,617) urine examinations.

Under malaria above, mention has already been made of the results of blood films examined for the presence of malaria parasites. Of faecal specimens examined 62 (61.6) per cent. contained ova of helminths.

Scientific investigations undertaken or commenced during the year included the following—

1. **Scrotal eczema etc.**—This investigation was referred to in the last issue of the Supplement (see this Bulletin 1935 Supp., p. 175*). The work was continued and feeding experiments were introduced and maintained, the following results being reported—

- (1) Boiled liver in quantities of six tahils daily can cure the condition in from two to three weeks.
- (2) Marmite half an ounce by weight daily can cure the condition in the same time. The curative value of Marmite is not destroyed by autoclaving it.
- (3) The substitution of maize for parboiled rice in the diet prevents the onset of symptoms. In view of the reputed association of maize with pellagra this is of interest.
- (4) The administration of orange juice in quantities of two ounces daily had not the slightest effect in curing symptoms.
- (5) Cod-liver oil one ounce daily was also without effect.

Further experiments in feeding are being continued in 1935.

2. **Comparison of the effects of quinacine and atebrin in malarial malaria.**—A series of 448 cases was treated alternately with quinacine and atebrin, thus avoiding a selection of cases. Treatments Quinacine sulphate gr. x. three times daily. Atebrin, gr. f three times daily.

Death rates Atebrin series 3·2 per cent quinine series 4·5 per cent. Average time required to control temperature in atebrin series 36·8 hours in quinine series 34·5 hours

Financial—Total expenditure of the Medical Department was \$987,081 (\$951,960). What proportion of the total revenue of the State this sum represents is not stated.

Kedah (1934)

Kedah, a Malay State under British protection lies on the west coast of the Malay Peninsula. It is bordered on the interior by Siam and Perak and includes the island of Langkawi and a number of smaller islands to the south. The mainland is about 105 miles long and about 65 miles wide at its widest part. Its area including the Langkawi group of islands is about 3,648 square miles.

Total Statistics.—The population in 1934 calculated by the geometrical method was stated to be 465,270 an increase of 10,990 over the estimated population in 1933. The distribution of the population by the three principal racial elements was given as follows: Malays 304,340 (289,214) Chinese 83,097 (83,470) and Indians 58,455 (\$6,009). The distribution of the population among the four districts into which the State is divided for administrative purposes was North Kedah 244,009 (231,821) Central Kedah 124,552 (70,758) South Kedah 83,675 (141,632) Langkawi and adjoining islands 13,034 (12,836).

The number of births registered during the year was 16,763 (17,033) with a birth rate of 36·03 (37·5) per mille. Contributions of the different races were: Malays 11,677 (12,030) birth rate 39·0 (41·6) Chinese 3,133 (3,215) birth rate 36·0 (38·5) Indians 1,606 (1,420) birth rate 27·0 (25·3) per mille. In this connexion it may be noted that while the sex ratio of the Malays approaches parity that of Chinese and Indians is 1,860 per 1,000 and 1,640 per 1,000 respectively.

1,004 (784) stillbirths were notified the stillbirth rate being 5·9 (4·6) per 100 registered live births. The incidence of stillbirths was highest amongst Malays—viz. Malays 788 rate 6·7 Indians 85 rate 5·3 Chinese 110 rate 3·5 per 100 births.

There were 10,165 (9,247) deaths registered during 1934 and the death rate was 21·8 (20·3) per mille. Deaths and death rates by racial distinction were: Malays 6,880 (6,297) rate 22·6 (21·8) Chinese 2,018 (1,775) rate 23·4 (21·3) Indians 966 (905) rate 17·0 (16·2).

About one-quarter of the total deaths occurred in the 0 to 1 age group the infant mortality figures reading Infant deaths 2,475 (2,398) infant mortality rate 148·0 (140·8) per 1,000 births. The highest rate was again amongst the Indian community—viz. Indians 288 (265) rate 188·0 (193·0) Chinese 464 (492) rate 148·0 (137·0) Malays 1,669 (1,616) rate 143·0 (136·0).

As regards Government Officials (other than subordinates) the following particulars are supplied Europeans resident 67 (64) average number resident 44 (44) there were no invalidings or deaths recorded. Asians resident 72 (75) average number resident 66 (67) 2 (0) were invalidated and 1 (0) death occurred.

The vital statistics of the 712 rubber estates in Kedah are presented under two headings—viz. (a) European Holdings and (b) Native (i.e. Asiatic) Holdings. The principal features of these data are set out as follows—

Race	Popula- tion	Births	(a) European Holdings			Infant Mort- ality	L.M.R.
			Birth rate	Deaths	Death rate		
Indians	74,901	937	33.4	332	1.3	203	214
Malays	3,148	56	17.6	43	13.6	14	250
Chinese	1,053	7	6.9	16	15.2	2	296
Others	235	—	—	1	4.2	—	—
Total	29,335	1,020	34.7	502	20.2	221	217
(b) Asiatic (Native) Holdings							
Malays	8,741	50	5.7	39	4.8	13	260
Chinese	3,675	24	6.7	23	6.4	3	125
Indians	423	39	16.1	31	14.0	14	339
Others	220	4	18.2	2	9.1	2	500
Total	14,960	117	7.6	93	6.5	32	273

Maternity and Child Welfare—The information under this heading is mainly confined to brief tabular statements which are quantitatively descriptive of the work accomplished by the lady Medical Officer. During the year she attended no less than 7,815 (1,682) outdoor cases—3,578 (1,917) of which were new cases—visited 1,855 (497) patients in their own homes and of these 591 (185) were new cases, and yet found time to attend 140 (134) outdoor maternity cases. [The measure of success achieved by Dr M. Brodie may be gathered from the fact that over 80 per cent. of the maternity cases were Malay women whose confidence by the exercise of tact and friendly sympathy she evidently secured. There is no mention of the methods adopted to attain this desirable result, and yet information of this kind might reasonably prove of the greatest assistance to others working among shy or suspicious people.] During the year 209 (192) deaths were recorded as due to affections connected with pregnancy and child-birth, giving a maternal mortality rate of 12.5 (11.2) per 1,000 births.

School Hygiene—Twenty-two Malay schools and 29 Chinese and other non-Government schools were visited. Among 4,197 (2,577) Malay children examined 792, or 36.0 (34.6) per cent. showed dental caries and 125, or 5.7 (6.6) per cent., enlarged spleens. Of Chinese and other school children 1,030 (778) were examined—dental caries was found in 748, or 69.3 (72.6) per cent., scabies in 9 per cent. and splenic enlargement in 2.6 (4.3) per cent.

Hygiene Sanitation etc.—There are nine Sanitary Board Areas in the State. The pail and burial method of sewage disposal is the general rule, though an isolated septic tank installation exists here and

there the improvement of existing conditions is under consideration. Refuse is disposed of by incinerator or burial. Piped water supplies are available in most of the Sanitary Board Areas. In emergency filtration and chlorination plant is held in reserve at Alor Star. Matters concerned with *Housing and Food Control* receive the attention of the Medical Authorities and Sanitary Boards.

Hospitals Dispensaries Clinical etc—Hospitals and Dispensaries in Kedah were the subject of description in the preceding issue (see this *Bulletin* 1935 Supp p 177*) making repetition unnecessary. Changes and improvements effected or in process of being effected include the removal of the dispensary for Malay women and children from Pumpong to Bakar Bata and the provision of a Motor Travelling Dispensary for each of the North Central and South Districts. A ward for the accommodation of phthisical cases is being constructed at the Hospital, Alor Star where additional quarters for attendants are also in course of erection. At the Sungai Patani Hospital two Malay wards of a new type are being erected.

A total of 14,367 (13,617) persons received treatment as inpatients in hospitals and prison sick wards. Among these 739 (646) deaths were recorded, 233 occurring within 48 hours of admission. The hospital death rate was 51.4 (47.4) per thousand patients or deducting from both sides the 233 patients who died soon after admission 35.8 per thousand. Alor Star, Sungai Patani and Kulim Hospitals were again the three institutions accommodating the great majority of cases, while Chinese Indians and Malays accounted for 13,978 of the total cases treated. The principal diseases were *Malaria* 3,239 (2,735) or 22.5 (20.2) per cent of total admissions *wounds and injuries* 1,676 (1,596) or 11.7 (11.7) per cent *ankylostomiasis* 757 (661) or 5.3 (4.9) per cent. *ulcers* 703 (1,038) or 4.9 (7.6) per cent. *respiratory diseases* (ex Pul. T.B.) 674 (743) or 4.7 (5.5) per cent. *venereal diseases* 358 (362) or 2.5 (2.7) per cent. *phthisis* 301 (333) or 2.4 (2.6) per cent and the *dysenteries* 180 (194) or 13.0 (14) per cent.

The Outdoor and Travelling Dispensaries treated 9,031 (85,750) persons, of whom 72,868 (71,108) were new cases.

Malaria.—4,504 deaths or 45 per cent. of the total deaths in the State were ascribed to malaria and fevers unspecified. Under the title of "unspecified fevers" though, the larger proportion would be due to malaria, not all the deaths under the title can be ascribed to the disease. Diagnosed malaria deaths were approximately 3 per cent. of those due to all causes. Malaria cases treated in hospital numbered 3,084 (2,754) and there were 107 (84) deaths recorded. In 2,721 (2,263) cases the nature of infection was defined—viz benign tertian 1,580 (1,204) or 57.3 (53.2) per cent. subtertian 1,055 (939) or 38.8 (42.4) per cent. quartan 69 (54) or 2.5 (2.4) per cent. and mixed infections 37 (46) or 1.4 (2.0) per cent.

During the year 14,045 (14,378) cases of malaria (this includes fevers unspecified) were reported from estates. Malaria deaths numbered 680 or 11.8 per cent. of the total deaths recorded. Asiatic holdings, with half the population of that on European holdings reported only about one-sixth of the former's cases despite inadequate treatment and the absence of anti-malarial measures on many of their holdings.

Malaria is still the main source of economic loss on the estates in Kedah. It causes approximately one death in ten and 320 cases of illness per 1,000 population per annum.

Dysentery and Diarrhoea were together responsible for 280 deaths. Dysentery cases treated in hospital numbered 180 of which 143 with 15 deaths, were amoebic and 32, with 7 deaths bacillary dysentery. 66 (33) deaths were recorded as due to *enteric fever*. 10 (4) cases of diphtheria and 5 (1) deaths were reported from urban areas, while of *tropical typhus*—a disease of rural areas—3 (0) cases, with no deaths were notified.

Of the *respiratory disease* group the Report says 179 deaths were due to *pneumonia*. In the Table IX on p. 19 of the Report 587 deaths are ascribed to this cause. 180 deaths are referred to *phthisis* but in the Table quoted 180 deaths appear under this title.

No comment is supplied in the Report relating to beriberi responsible for 263 (181) deaths *enteric fever* 68 (33) deaths *syphilis* 25 (22) deaths *anthracosomiasis* 20 (129) deaths.

At the six centres providing treatment facilities for leprosy 95 (69) lepers were admitted making, with those remaining from 1933, a total of 227 (206) cases. 137 (127) of the latter were accommodated at the Pulau Jerejak Settlement. Of the total cases treated, 3 were discharged, 57 transferred, 12 absconded and 17 died during the year. Pangkor Laut Asylum was closed during the year. Kedah lepers there being transferred to Sungai Buloh.

Laboratories—At the five hospital laboratories 31,303 (33,729) specimens were examined during the year. No details as regards results of these examinations are given.

Financial—Total expenditure amounted to \$411,924 as against \$404,870 in 1933 (the latter figure is not in agreement with totals presented in the 1933 Report). No mention of the total revenue of the State occurs.

Perlis (1934)

Perlis is the most northerly of the Malay States, lying on the west coast of the Malay Peninsula. It is bordered on the interior by Selangor to the north and Kedah to the south and has an area of about 318 square miles.

Vital Statistics—The geometrical method is used for estimating the annual population, the figure for 1934 being 52,723 (51,844) and the racial distribution, Malays 41,649 (41,078) Chinese 7,830 (7,423), Indians 1,251 (1,005) Europeans and Eurasians 25 (25) and Others (mostly Siamese) 2,148 (2,113).

Registered births are stated to number 1,730 (1,944 not 1,346 as stated) and the crude birth rate 32.8 (28.0). It is clear however that stillbirths (64) are erroneously included. Births should, therefore, read 1,666 (1,344) and the birth rate 31.6 (28.0). Correcting for stillbirths again, births and birth rates with distinction as to race would read Malays 1,360 (1,147) birth rate 32.8 (27.9) Chinese 230 (157).

birth rate 29·4 (21·2) Indians 30 (12) birth rate 24·0 (11·9) and "Others" 46 (27) birth rate 21·4 (12·8). The notable increases are no doubt due in part to improved registration for the *Registration of Births and Deaths Enactment* 1933 became effective on the 4th of April 1934.

Deaths numbered 885 (855) and the death rate 16·8 (16·6) per thousand, the racial distribution of mortality data reading Malays 630 (616) death rate 15·2 (15·0) Chinese 211 (185) death rate 27·0 (25·0) Indians 15 (20) death rate 12·0 (20·0) and Others 29 (33) death rate 13·5 (15·6).

Infant Deaths totalled 139 (134) and the infant mortality rate 83·4 (96·4) per thousand births. Some notable differences are observed in the infant mortality rates of the principal races concerned—viz Malays 78·5 (82·1) Chinese 121·7 (181·1) Indians 133·3 (142·9) and "Others" (i.e. Siamese) 65·2 (185·2).

Of *Government Officials* (including subordinates) the following particulars are noted Europeans resident 3 (2) average number resident 2 (2) there were no deaths or invalidings Asiatics resident 316 (295) average number resident 316 (295) 3 (2) were invalidated and 2 (1) died.

There are only three *Estate*s of any importance all owned by Asiatics. On one but few labourers are employed the population of the other two being returned as 437 (371). Ten (3) births and 2 (0) deaths were recorded during the year 96 (70) were admitted to hospital where 2 (4) died.

Regular fortnightly visits were made to 16 schools by the Travelling Dispensary. Of the 4 girls and 20 boys Malay vernacular schools 12 (14) boys schools were visited by the Assistant Surgeon when 883 (1145) pupils out of 1148 (1351) on the registers were examined. Dental caries 61·4 (52·1) per cent. and enlarged spleens 30·7 (23·4) were the principal defects noted. 55 children had N.A.B. injections for year.

Hospitals Dispensaries Clinical etc—There was an increase in the numbers of cases admitted for *pneumonia ankylostomiasis* and *pulmonary tuberculosis*. Total cases treated as in patients numbered 1403 (1373) of which 1,352 (1,334) were admitted during the year 114 (81) deaths occurred in hospital 44 (32) dying within 48 hours after admission.

Among out patients 6,386 (7,059) new cases were treated, the majority of these being Malays 3,940 (4,485) Indians 1,233 (1,388) and Chinese 1,123 (1,012). Excluding cases attended at schools police stations, coolie lines etc. the Travelling Dispensary treated 763 (957) cases.

Malaria—Total deaths due to malaria were 38 (25) and to Fever Unspecified 323 (285) many of the latter including undiagnosed malaria cases. Hospital patients treated for the disease were 362 (363) and 18 (17) deaths occurred. Of hospital patients the type of infection was defined in 314 cases—viz subtertian 41·7 (44·8) per cent. benign tertian 31·5 (34·6) per cent. quartan 1·3 (0·9) per cent. and mixed infections 25·5 (19·5) per cent.

Endemic Fever was responsible for 16 (17) deaths 6 (6) cases were treated as in-patients 4 (1) died. Total deaths due to *dysentery*

numbered 4 (9). 18 (27) patients were treated in hospital and 1 (2) death occurred. Of these 18 hospital cases amoebic dysentery was diagnosed in 14 cases but the type of infection in the remaining four was not defined. There was a decrease in the numbers of deaths due to pulmonary tuberculosis—32, as compared with 45 in 1933 there were 27 (24) hospital cases among whom 6 (3) deaths occurred.

Pneumonia (all forms) was the cause of 49 deaths as against 21 in the preceding year for this disease 73 (55) cases received hospital treatment and 43 (19) deaths were recorded. There were fewer deaths ascribed to *syphilis/tuberculosis* 4 (5) but hospital cases were more numerous, 87 as compared with 47 in the preceding year.

Rabies remains a problem 23 (15) cases of dog-bite being reported. Five dogs were killed on the spot and the brains of three of them sent to the Institute of Medical Research Kuala Lumpur for examination where two were reported positive for rabies. Ten (9) persons bitten by dogs rabid or suspected of being rabid, received treatment at the Alor Star Hospital. Two cases (both Chinese mining coolies) died shortly after admission to hospital both had histories of dog-bites untreated from ignorance. Another a Malay boy died a few weeks after completion of treatment cause of death unknown.

Financial.—Expenditure on Medical and Sanitary Services amounted to \$23,497 as against \$21,379 in 1933. The total Revenue of the State is not recorded.

Kelantan (1934)

The State of Kelantan is on the eastern side of the Malay Peninsula. On the north is the China Sea, on the south Pahang, on the east Trengganu and the China Sea on the west Perak and Siamese Territory. The area is estimated at 5,720 sq. miles or rather less than that of Yorkshire.

Vital Statistics.—In Appendix IV to this Report it is observed that the method adopted for the estimation of the required population figure is that used by the Registrar-General, Straits Settlements. That method takes the most recent census figures, and, by adding the excess of births over deaths and by making due allowance for the difference in the numbers of immigrants and emigrants, thus arrives at the estimate required for a specific year. As the Report calls attention to the probable inaccuracy of birth and death statistics, and makes no reference to migration data in the State the estimates, which are supplied for purposes of comparison with previous years, should be accepted with reserve.

The estimated population for 1934 was returned as 398,509 (368,000). Registered births numbered 11,095 (10,972) birth rate 28.7 (29.7) and deaths 7,309 (6,439) with a death rate of 19.4 (17.4) per mille. Infant deaths totalled 1,444 (1,423) and the infant mortality 130.1 (131.5) per thousand live births. So far as can be seen not a single stillbirth was notified during the year.

Of officials the following facts are supplied. European resident 30 (22) average number resident 30 (18) No invalidings were recorded, but 1 (0) death occurred. Non Europeans resident 577 (1 138) average number resident 577 (633) 7 (19) were invalidated and 3 (2) deaths were recorded.

The total labour force on seven estates was 2 278 (2 016) and of these 1 154 were Indians and their dependants. Indian births numbered 44 (31) and deaths 37 (32) the resulting birth and death rates being 88.1 and 32.1 respectively. Deaths of Indian infants 0 to 1 year totalled 21 (7) the infant mortality rate being 477.3 per thousand births, as against 137.2 in 1933.

Maternity and Child Welfare—The absence of organized Child Welfare work has been the subject of mention in previous issues (see this *Bulletin* 1934 Supp p 147* and 1935 Supp p 180*) There were 208 attendances at the Infant Clinic of the Kota Bharu Female Hospital and 41 (45) midwifery cases—28 at Kota Bharu and 13 at Kuala Krai. Malay women are still reluctant to take advantage of available services they seem averse to entering maternity centres and their faith in their own midwifery methods gives rise to prejudice against Western methods. As from the 1st January 1935 the work of a newly appointed Infant Welfare Nurse may serve to combat existing prejudices and instil in their place a proper appreciation of modern methods of midwifery and infant care.

School Hygiene—The numbers of Malay vernacular schools remains unchanged (see this *Bulletin* 1935 Supp p 180*) 45 (42) of the more accessible schools were visited and 2 780 (2 207) children examined. Active yaws was seen in 1.46 (3.90) per cent of the children and healed scars of former infections were present in 71.4 per cent. In 21 (13) out of the 45 schools visited the spleen rate was nil [The figures appear to need careful checking for the Report goes on to say]

Only 24 schools (i.e. those remaining) showed a spleen rate of 3.7 per cent. or over though it is noted that four schools showed rates below 3.7 per cent. It would be of interest to know what causes produced the reduction of the spleen rate of Gunong School from 52.8 per cent. in 1933 to 9.3 per cent. in 1934.]

Public Health Hygiene Sanitation etc—The general health of the State was good. Health conditions on estates employing Indian labour were very satisfactory. The general sanitary services continued to be carried out as previously described (see this *Bulletin* 1935 Supp p 180*) Improvements included the construction of an additional 4,890 feet of open concrete drains the construction of the piped water supply for Kota Bharu which approaches completion while the system of weekly oiling to control mosquito breeding was extended to include Tumpat Pasir Putch Pasir Mas Dabong and Gua Musang.

Hospitals Dispensaries Clinical etc—There has been no addition to the number of hospitals and dispensaries previously described (see this *Bulletin* 1935 Supp pp 180*-181*) In patients treated at the hospitals numbered 5 025 (5,559) and there were 207 145 (199 431) attendances at the dispensaries the distribution of cases being as follows—

Hospital	Admissions	In-patients	Deaths	Out-patients	
		Total cases treated		New cases	Total treated
European	28 (23)	28	1	—	—
Kota Bharu (Male)	2,818 (2,745)	2,736 (2,668)	84	38,833 (42,430)	47,563 (50,346)
Kota Bharu (Female)	708 (684)	736 (721)	22	—	—
Kuala Krai	1,447 (1,832)	1,519 (1,687)	88	12,647 (17,397)	16,614 (20,546)
Total	4,802	8,019	185	51,530	64,177

The figures of cases treated (5,019) extracted from the text, pp. 9-11 are not in agreement with the totals presented in the hospital returns on p. 25 of the Report. In addition to the above details, 54 (52) patients were admitted to the Mental Diseases Hospital and 13 cases of chicken-pox isolated in the wards of the Isolation Camp. As regards Dispensary Returns the position was as follows —

Dispensary	New cases	Total attendances
Pasir Puteh	5,850 (8,197)	18,512 (18,536)
Tumpat	9,364 (10,334)	18,980 (22,449)
Pasir Mas	22,631 (10,079)	29,464 (11,079)
Total	37,844 (28,610)	64,756 (52,034)

The Travelling Dispensary paid weekly visits to 30 centres, when 74,081 (76,433) attendances were recorded, while a Dresser from Kuala Krai visited four other centres and treated 4,151 cases.

Malaria — Though the numbers of in patient malaria cases were fewer 781 as compared with 964 in 1933 a larger number of cases received treatment at the dispensaries. Of 282 of the 781 in-patient cases the plasmodium was determined, the distributions being subterian 176 or 67.1 (79.5) per cent. benign tertian 64 or 24.4 (14.3) per cent quartan 18 or 6.0 (4.7) per cent. and mixed infections 4 or 1.5 (1.5) per cent. In 404 cases the nature of infection was not defined, while 95 were cachetic. Of 2,095 blood films examined at the Kota Bharu Hospital 208 contained malaria parasites—viz. 114 subterian, 68 benign tertian 23 quartan and 3 mixed infections. 165 (284) out of 677 (1,206) examined at the Kuala Krai Hospital were positive films the percentage proportions of these being subterian 64.2 (78.0) benign tertian 29.1 (14.4) quartan 5.5 (8.1) and mixed infections 1.2 (1.5). In the majority of cases thin films were examined, and the proportion of subterian infections is probably higher than laboratory findings indicate.

Dispensary Returns record 23,756 (15,617) attendances for the treatment of clinical malaria increases being noted in the returns from Pasir Mas 6,885 (337) the Travelling Dispensary 12,581 (10,524) and Tumpat 1,368 (1,157).

In connexion with the incidence of malaria in the State it is to be noted that the colloquial term *Denam kura* is practically always used when malaria is meant and that deaths ascribed to this cause appear under the title *Fever Unspecified* (probably malaria) 122 (in the Table given as 82) deaths were reported due to this disease while under the title *Fever Unspecified* no less than 4 049 deaths or over 55 per cent. of the total registered deaths in the State were recorded.

Of other mosquito-borne diseases the Report observes *yellow fever* does not occur no case of *dengue* was seen and *elephantiasis* is uncommon.

As regards infectious diseases no case of *smallpox*, *plague* or *cholera* was recorded. As a routine anti-cholera measure all wells in the large towns are pinked with potassium permanganate at intervals throughout the dry season 112 (135) cases of *pneumonia* with 43 (36) deaths, and 104 (103) cases of *pulmonary tuberculosis* with 23 deaths were admitted to Government hospitals 7 Government officers were invalidated out of service for *phthisis* 25 cases of *chicken pox* were seen.

Among the communicable diseases cases of *yaws* though still common appear to be definitely fewer 505 (536) cases received in patient treatment at Government hospitals while 20 182 (22 093) attendances for treatment at the various dispensaries were recorded. Venereal diseases are said to be rarely met with in rural areas but are common in the large towns [It is to be regretted more care was not devoted to checking recorded facts for of venereal diseases the following confusing statements relating to hospital patients are supplied — (a) 302 cases (b) 217 cases 1 death (c) 223 cases 1 death (d) 25 cases no death. Dispensary attendances appear to total 775]

Three cases of *tropical typhus* were admitted to hospital one death occurred. Clinical diagnosis of two of the cases was confirmed by laboratory tests at the Institute for Medical Research Kuala Lumpur the serological types being defined as W and K in a Malay and a European respectively.

The dysenteries were responsible for 90 (79) admissions to hospital and 9 (4) deaths the stools of all these patients were examined at the State Hospital Laboratory Kota Bharu when 73 were found to contain *E histolytica* or its cysts. It is difficult to believe that bacillary dysentery is rare in rural villages where sanitation is crude and conservancy non-existent. Moreover localized epidemics have been usual during 1934 as in previous years yet cases are rarely admitted to Government hospitals. But though cases are not seen in hospital practice the fact that during the year in 261 deaths the cause was attributed to *cheroh* — a term which defines symptoms usually associated with bacillary dysentery — supports the belief that the disease is not uncommon.

Public Health measures for the control of leprosy remain as previously described (see this *Bulletin* 1935 Supp p 182*) 13 (15) new cases were diagnosed during the year of which 3 (13) were Malays the rest Indians and Chinese. The position as regards lepers at the various Settlements at the end of the year was At Tumpat 1 (3) at Pulau Jerejak 14 (11) at Sungai Buloh 2 (3) and isolated privately 38 (36).

Rabies shows no signs of abatement in the State. 12 (11) persons—7 Malays 4 Indians and 1 Chinese—bitten by dogs were treated with vaccine obtained from Kuala Lumpur. Of 7 (9) dogs brains forwarded to the Institute for Medical Research Kuala Lumpur 3 (4) were positive for rabies. Though muzzling orders were in force, 906 dogs found at large unmuzzled were shot by the police.

Helminthiasis.—Apart from organized groups of labourers, who are usually given prophylactic treatment twice a year and treatment of cases met with in the various hospitals and dispensaries little can yet be done in the way of prophylaxis of helminthic diseases at present. *Ankylostomiasis* and *ascariasis* are common infections. 470 (489) cases of the former and 208 (155) of the latter received in-patient treatment at Government hospitals. At the State hospital Laboratory Kota Bharu of 3,280 stools examined 1,374 or 42 per cent. contained hookworm ova and 814 or 25 per cent. *ascaris*. 18 hospital deaths were ascribed to *ankylostomiasis* while 67 of the total deaths occurring in Kelantan were due to this cause.

The groups *Diseases of the Skin* and *Injuries* "appear to be important causes of temporary disablement and throw a heavy burden upon hospital accommodation. 537 patients received hospital treatment for affections of the skin and of these no less than 441 were classified under the title of *Ulcer*. 669 in-patients received treatment for injuries of various kinds 457 of these being injuries due to wounds of various kinds.

[A revision of the nomenclature used for hospital returns appears to be long overdue.]

Financial.—Expenditure on Medical Services amounted to \$150,239 (\$152,971) or 89 (8·4) per cent. of the total Revenue of the State.

Trengganu (1934)

The State of Trengganu lies on the eastern seaboard of the Malay Peninsula 4° and 5° 5' N. latitude and 102° 20' and 103° 30' E. longitude. It has an area of 5,050 sq. miles.

Local Statistics.—The geometrical method of estimating the population is used. It is not without interest to note the method differs from that adopted in the adjoining State of Kelantan, though conditions as regards migration are similar.

The mid year population was estimated to be 189,161 (186,227). There were 6,330 (7,078) births, with a birth rate of 33·5 (38·0). The percentage distribution of registered births was Malays 85·4 (95·6), Chinese 4·2 (3·8) Indians and Others 0·5 (0·5) Europeans and Eurasians nil. Deaths numbered 4,590 (3,619) the resulting death rate being 24·3 (19·4) per mille. Of total deaths recorded deaths of Malays were 83·3 (95·1) per cent. Chinese 5·9 (4·2) per cent., Indians and Others 0·8 (0·7) and Europeans and Eurasians nil.

Infant deaths numbered 1,401 (1,159) and the infant mortality rate 221·3 (163·7) per thousand registered births. 170 (53) stillbirths were notified the increased figures being attributed to more efficient registration during the year.

Thirty (25) Europeans were resident and of these 16 (16) were European officials. The average number of officials resident during the year was 11 (10). There were no births deaths or invalidings among the European community.

Maternity and Child Welfare—The organization of Maternity and Child Welfare Work remains as previously described (see this *Bulletin* 1935 Supp. p 183*) Total attendances at the Clinic numbered 7 130 (7,554). There were 2,948 (2,807) new cases distributed as to Chinese 1,552, Malays 1,381 Indians and Others 15. The Midwife in charge of the Clinic attended 112 (127) confinements in the homes of 60 Malays and 52 Chinese expectant mothers. Of the 44 (44) labours in hospital 33 of the women were Chinese.

School Hygiene—The usual routine inspections of Government schools were carried out and reports received regarding structure ventilation, lighting and general sanitation of school premises. The inadequate provision of sanitary conveniences is receiving attention. Children medically examined numbered 1 572 (1 754) or 74·0 (73·4) per cent. of the numbers on the registers. 50 per cent. of the total examined attended schools at Kuala Trengganu. The spleen rate for the State as a whole was 3·12 (1·69) per cent. local spleen rates were Kuala Brang 30·8 per cent., Kuala Trengganu 0·26 (0·64) per cent., other schools 5·96 (2·70) per cent. Dental caries was noted in 41·3 (41·1) per cent. scabies in 13·4 (15·4) per cent. ulcers in 3·9 (4·2) per cent. and other diseases mainly ear and eye afflictions in just over 6 per cent. of children examined.

Public Health Sanitation etc—Such organized services as exist have been previously described (see this *Bulletin* 1935 Supp. p 183*) and were little changed during 1934. Regarding disposal of refuse a new ravine dumping site was started in Kuala Trengganu while the provision of rubbish bins for the market etc. is an improvement upon former conditions. Preliminary enquiries have been made with regard to a piped water supply for Kuala Trengganu from a source 40 miles distant.

Little has been done in the direction of Public Health propaganda work. Officials endeavour to impress upon the people the importance of individual and domestic cleanliness and hygiene is a subject of instruction in the schools. The value of posters on malaria, hook worm, etc. which have been circulated, is diminished by reason of the illiteracy of the people.

With regard to *Labour conditions* the three mines referred to in the preceding issue (see this *Bulletin* 1935 Supp. p 183*) employed an average of 2,100 (1,669) coolies. Among these labourers 29 (7) deaths occurred, 3 (5) being due to accidents and 785 (256) cases of malaria were reported. Only 1 (0) death was ascribed to malaria. On the Kretay Rubber Estate an average of 403 (358) labourers were employed, and 7 (5) deaths were recorded, 3 being due to malaria.

Hospitals Dispensaries Clinical etc—Hospital and Dispensary facilities remain much the same as previously described (see this *Bulletin* 1935 Supp. p 184*) During the year the Public Works Department established a dispensary at Kampong Buloh. Eleven rural police stations and four Customs stations which are situated in places where there are no dispensaries established, are supplied with small

stocks of simple drugs. Hospital admissions totalled 1,775 (1,710), with 61 deaths in addition 41 (47) prisoners were admitted to the gaol ward where two deaths occurred. The growing popularity of the Government Hospital is reflected in the increasing number of Malay patients. During the past five years the percentage proportions of Malays to all admissions have been 39·9 40·5 49·1 58·3 and for the year under review 59·2.

New patients treated at the dispensaries numbered 94,226 (91,698), or an increase of 5 per cent. over the 1933 figures, and total attendances 117,406 (112,963). Outlying villages are regularly visited by dressers in charge of dispensaries, who also visit patients in their own houses when these are conveniently near headquarters stations.

From analysis of the data relating to total numbers of patients treated, both in-patients and out-patients the most prevalent diseases appear to be *malaria* 12,685 (10,718) cases, *intestinal parasites* 11,080 (8,561), *respiratory diseases* 4,808 (3,108) cases 4,400 (4,789), *influenza* 2,986 (2,278), *fever unspecified* 1,019 (1,695) and *beriberi* 968 (782). Compared with 1933 experience the increases were (in order of descending magnitude) respiratory diseases 48 per cent., influenza 31 per cent., intestinal parasites 29 per cent., beriberi 24 per cent. and malaria 21 per cent. the only diseases showing decreased incidence were fever unspecified 40 per cent. and yaws, 8 per cent.

The figures assembled in hospital and dispensary returns are held to provide a better guide to the incidence of disease in the State than are the lists of reported causes of death. Regarding the latter deputy registrars have little or no medical knowledge and in only about 1 per cent. of the 4,590 deaths recorded during the year were causes of death certified by a qualified medical practitioner.

Malaria—The general distribution and incidence of the disease, both as regards the State as a whole and in specified localities, remain as already described in some detail (see this *Bulletin* 1935 Supp., p. 184*). The conclusion reached is that incidence increases with distance from the coast. In other words anti-malarial measures are most urgently required in those parts of the country where they are most difficult to introduce, with the result that the free distribution of drugs remains at present the only effective measure possible. In isolated places small quantities of quinine are left with responsible people, but even this becomes impossible in remote areas in the interior where the people though every effort is being made to secure their confidence are suspicious of Europeans and their ways.

In addition to the 12,685 malaria cases treated, 2,529 (2,061) deaths in the State were ascribed to "fever" during 1934 and of these fever deaths, 92 were reported as due to *malaria*. The increase from 19 in 1933 to 92 in 1934 is ascribed to an effort made to secure greater accuracy in recording causes of death but the figure is obviously far wide of the actual state of things, for many of the "fever" deaths should undoubtedly be defined as malaria deaths. Of the 167 (120) malaria cases admitted to hospital, and a total of 172 (122) cases treated, 133 were unclassified, 22 (4) benign tertian, 8 (25) sub-tertian, 3 (9) quartan and 6 (84) cachectic. 85 (90) out of 1,880 (1,674) blood specimens examined at the laboratory were positive for malaria.

parasites as were 291 out of 950 specimens examined at the dispensaries at Besut, Dungun and Kermaman. Hospital laboratory and dispensary classifications for 1933 and 1934 are not without interest

etc. —

	Hospital		Laboratory		Dispensaries	
	1933	1934	1933	1934	1933	1934
Benign tertian	•	3.3	12.8	23.2	49.4	52.2
Quartan	—	7.4	1.7	22.2	10.6	4.5
Sabertian	—	20.5	4.4	53.5	38.5	36.8
Cachexia	—	68.9	3.5	—	—	—
Unclassified	—	—	77.3	—	—	—
Total specimens	—	122	172	99	85	155
						291

Having regard to the extremely unhygienic conditions characterising certain areas of the State it is remarkable that dysentery and enteric fever are not more prevalent sporadic cases only were reported. 29 (36) cases of dysentery of which 25 (29) were amoebic were treated in hospital and there were 6 (6) deaths 167 (170) received out patient treatment and of these 84 (58) were diagnosed as amoebic the number would probably have been greater if more extended facilities for correct diagnosis had been available 7 (7) cases of enteric fever were treated with no deaths.

No case of any dangerous infectious diseases was reported. There was an increase in the number of cases of influenza 2,986 as compared with 2,278 in 1933 126 cases were treated in hospital no death was recorded. There were 30 (38) cases of chickenpox 93 (18) cases of measles with 4 deaths 8 (5) cases of rumps and 6 (4) cases of whooping cough.

As has been noted above, there was a considerable increase in the number of cases of respiratory affections treated at various centres. Unfortunately details are meagre. 101 (92) cases of pulmonary and laryngeal tuberculosis were treated 48 (46) were hospital in-patients among whom 15 (8) deaths occurred 132 persons were reported to have died of respiratory diseases 45 of these deaths being ascribed to tuberculosis.

Helminthic Infections are extraordinarily prevalent. Over 90 (86) per cent. of the school children examined in Kuala Trengganu were found to be infected. At the laboratory out of 1,714 (1,891) faecal specimens examined for ova and parasites over 84 (76) per cent. were infected, multiple infections being frequent Ascaris 70 (53) per cent. Trichuris 58 (52) per cent. and Ancylostoma 29 (32) per cent. were the most common 77 (90) per cent. of specimens examined in out-stations were positive ascaris being about twice as common as ancylostoma whereas in inland districts the latter is more prevalent than is ascaris The results of laboratory examinations were as follows Stools examined 1,714 positive 1,438 (1,445 out of 1,891) stools containing (a) Ascaris and Trichuris 534 (398) or 37.1 (27.5) per cent. (b) Ancylostoma Ascaris and Trichuris 323 (415) or 22.5

(28.7) per cent. and (c) Ascaris only 261 (274) or 18.2 (18.9) per cent. At the Besut, Dungun and Kemaman dispensaries the results were Stools examined 825 positive 625 stools containing (a) Ascaris and Trichuris 119 or 19.0 per cent. (b) Ancylostoma, Ascaris and Trichuris 167 or 26.7 per cent. and (c) Ascaris only 239 or 38.2 per cent.

Beriberi cases numbered 968 (782) and deaths due to this disease 88 (84) 102 cases received in patient treatment and among these 7 deaths occurred. The disease is said to be common along the coast among people who buy polished rice and rare in the interior when home-grown unpolished rice is eaten.

Leprosy is a widespread affection commonest along the coast. 4400 (4789) cases of the disease were treated these including 405 (496) in patients among whom two deaths occurred. The routine treatment has been bismuth-sodium-tartrate which has the merit of cheapness, but for various reasons the drug is being replaced by stovarsol, neocarphenamine etc the use of these will be extended if funds permit.

Beyond mention of the occurrence of three deaths due to leprosy during the year no other particulars of the disease are presented. With regard to other ailments 9,880 (12,280) cases of syphilis and 8,064 (8,534) of scabies received treatment 110 of the former and 14 of the latter as in-patients.

Financial—Medical Department expenditure during 1934 amounted to \$50,390 (\$50,485) or 4.2 (5.3) of the total Revenue of the State. Actual expenditure was \$3,066 less than that estimated while revenue from the Medical Department amounted to \$784 as against \$517 in 1933. Owing to the improved finances of the State an expenditure of \$75,652 is provided for

BRUNEI (1934)

The native State of Brunei lies on the north west coast of the island of Borneo between North Borneo and Sarawak. It is 770 miles from Singapore and has an area of about 2,200 square miles or rather smaller than the county of Devon. In Brunei Bay lies the island of Labuan.

Vital Statistics—The estimated population was 32,971 and this figure related to the numbers of registered births, 1,306 (1,411) and deaths 1,237 (837) gives birth and death rates of 39.6 (42.9) and 37.5 (28.4) respectively. Total deaths of children under one year numbered 464 (336) or an infant mortality rate of 355 (236.1) per 1,000 births. The tabulated causes of death are said to be unreliable the Report adding less than 1 per cent. of the deaths were medically certified. From data in the Appendix in a later section it would appear that 9.3 per cent. of deaths were medically certified, 69.5 per cent. certified by registered officers after death and 21.2 per cent. uncertified.

[It is unfortunate that population figures for the separate races inhabiting Brunei are not available, as without such data the value of the tabulations of births and of deaths with distinction as to age and sex is largely lost. The census report of 1931 tabulates the figures for Europeans Eurasians Chinese and Malays, but other racial elements comprising Dusuns Muruts Kedayans and Tutoongs are grouped under other Malaysians. It has been suggested by

certain writers that the *Dusuns* of Borneo an agricultural people inhabiting the open high lands are a thriving race whose numbers are increasing whereas the *Muruts*, a hunting people and jungle inhabitants are steadily decreasing in number From vital facts assembled it should be possible to determine population trends and measure the rate of progress or decay characterizing this or that people but to do this population figures for the separate racial elements are necessary]

Maternity and Child Welfare—The service inaugurated in 1933 has been maintained with one qualified nurse and one locally trained midwife. 436 maternity cases were attended in the homes of expectant mothers only two cases of puerperal fever were recorded and one death due to severe post partum haemorrhage. The majority of the cases (399) relate to Brunei Malay women. It will have been observed that the infant mortality rate was higher in 1934 than in 1933 the increase may be due to a bigger registration of births and infant deaths resulting from the extended activities of maternity work In addition to maternity cases 1 624 other patients attended the clinic for advice and treatment the total cases included 345 helminthic infections 683 diseases of the skin etc. 301 gastro-intestinal diseases and 175 respiratory affections

Public Health Sanitation etc—The scattered nature of the population and inaccessibility of large tracts of the State render the application of public health measures difficult if not impossible except in the main centres of population—viz Brunei Town and Kuala Belait It is presumed that as no reference is made to such matters as School Hygiene water supply sewage disposal etc. these services remain as previously described (see this Bulletin 1935 Supp pp 186*-187*) There was no major epidemic of infectious disease during the year Anti-malarial work has been carried out at Brunei Kuala Belait and Muara at Brunei largely subsoil and surface drainage and oiling Anopheline mosquitoes identified in order of frequency were at Brunei, *A. kochi* *A. barbirostris* *A. tessellatus* *A. sundasicus* and *A. leucaspiphrys* and at Kuala Belait *A. umbrosus* *A. tessellatus* and *A. separatus*

Hospitals Dispensaries etc—During the year a block of two wards each for nine beds was added to the Brunei Hospital and a hospital of eight beds erected at Temburong The Government now maintains three hospitals—Brunei Temburong and Tutong—with out patient dispensaries at these centres. There are no radiological facilities whatsoever in the State, while the nearest X-ray apparatus is at Miri in Sarawak, a day's journey from Brunei. Other hospitals and dispensaries in the State include the hospital maintained by the Oil Company at Kuala Belait the hospital and dispensary of the Labu Rubber Estate, and the dispensary of the Gadong Rubber Estate.

Admissions to Government hospitals were Brunei 287 (258) Tutong 78 and Temburong 8 out patients treated at these centres numbering 5,811 (5,404) 3,534 and 1,762 respectively The principal causes of sickness and death during the year were as follows —

Malaria—The disease is fairly common throughout the State but is not bad in the main centres where anti-malarial measures are carried out 79 deaths were ascribed to this cause. Total admissions to hospitals numbered 54 of which 20 were defined as malarial cachexia,

12 benign tertian 9 subtertian 7 quartan and 6 as mixed or unclassified infections. 812 out-patients received treatment at hospital dispensaries during the year. At Brunei Hospital laboratory 421 blood films were examined for malaria parasites, and 37 or 8·7 per cent. were positive of the latter 17 or 45·9 per cent. were subtertian, 14 or 37·8 per cent. benign tertian and 6 or 16·2 per cent. quartan. Of 38 blood films examined at the Temburong Hospital only one was positive—subtertian. Among 800 school children examined at 13 centres in the State, 39 or 4·3 per cent. showed palpable spleens the highest spleen rate (25·5) was observed at Muara and the lowest (0) at Bangar Lubok Pulau and Belait.

There was a severe outbreak of beriberi towards the end of the year due presumably to a poor local rice harvest. The disease was particularly severe on the Labo Rubber Estate at one time nearly half the labour force being incapacitated. Curative and preventive measures cleared up the trouble before the end of the year. 25 cases were admitted to Government hospitals with 3 deaths while 40 deaths were ascribed to this cause.

Helminthic infestations are common ascariasis being especially prevalent among children. The stools of school children are examined annually and infected children treated. During the year of 900 children examined, 502, or 55·7 per cent. were infected with ascaris ova. At Government hospitals 1,049 stools were examined and 600 or 57·2 per cent. were similarly infected, while 988 out-patients received treatment for ascariasis. Ankylostomiasis is less common, only 2·5 per cent. of stools examined at hospital laboratories containing ova.

The dysenteries were responsible for 29 deaths. The Report states that 16 cases of bacillary dysentery, and one of amoebae were seen during the year but in the returns relating to out-patients 40 cases of bacillary dysentery are recorded.

Syphilis is rarely seen, only two cases being recorded during the year. On the other hand gonorrhoea is very prevalent, probably more common than assembled data suggests, 7 hospital cases and 17 out patient cases appearing in the returns. Among the native population the disease appears to be of mild type which responds rapidly to treatment.

Tuberculosis is fairly common throughout the State. 137 cases were seen, 11 of which were hospital admissions.

Respiratory diseases are a serious cause of sickness and death in the State. Pulmonary tuberculosis was the cause of 45 deaths, pneumonia of 25 other diseases of the respiratory tract 23. There were 22 admissions to Government hospitals and 1,299 out patients received treatment for respiratory affections.

Financial—Total State expenditure on Medical and Health matters amounted to \$50,535·88 a sum which represented 9 per cent. of total State expenditure during 1934.

HONG KONG (1934)

Hong Kong is one of a number of islands off the south-east coast of China at the mouth of the Canton River about 91 miles south of Canton and 40 east of Macao. Hong Kong is 11 miles long and from 2 to 5 miles wide and has an area of about 32 square miles. It is separated from the mainland of China by the Lyceum Pass. The peninsula of Kowloon on the mainland area 2½ square miles forms part of the Colony together with the adjacent New Territory. The whole Colony has an area of about 345 square miles.

General—The slump in trade with the consequent reduction of revenue, continued to hamper progress towards reorganization and expansion with the result that the erection of a new infectious diseases hospital, a new mental hospital and the proposed model field health station, had again to be postponed. In spite of severe financial handicaps however substantial advancement was made with a number of schemes of work. Good progress was made with the construction of the Government Civil Hospital, work was commenced on a new Health Centre for the Eastern District of Victoria several units of the Kowloon Hospital extension scheme were completed the Lady Ho Tung Welfare Centre was opened in May a new Infant Welfare Centre was opened in the Central District of Kowloon on the 1st of June and three new village dispensaries were established.

Vital Statistics—Except in census years there are no dependable population data, the great movement to and from the Colony and the facility with which the border can be crossed proving handicaps to accurate checking. The estimated population at the middle of the year was 944,492 (922,643) and 923,584 (902,197) or 97.8 (97.3) per cent. of these were Chinese. Of the total population 383,065 (373,419) reside in the City of Victoria, 47,516 (45,713) in villages of Hong Kong 311,110 (297,213) in Kowloon, 102,801 (101,298) in the New Territories exclusive of Kowloon and, finally, it is estimated 100,000 (100,000) were Chinese living on junks and sampans. With regard to the latter estimate it may be added that over 20,000 local boats are registered at the Harbour Office and occupants of each will range in number from 4 to 40 according to size and character of craft.

As a result of the introduction and strict enforcement of the new Births and Deaths Ordinance the registration of births though still far from complete, was greatly improved. It is considered that practically all deaths are registered. Total births were 20,886 (15,362) giving a birth rate of 22.1 (16.6) per 1,000 and of the total births recorded 20,424 (14,909) were Chinese with a birth rate of 22.1 (16.5). Registered deaths numbered 19,766 (18,161) and the death rate 20.9 (22.1) deaths of Chinese totalling 19,516 (17,928) with a Chinese death rate of 21.1 (22.4) per 1,000. Respiratory affections accounted for 40 (42.0) per cent. of the total deaths.

Infant deaths were 7,117 (6,822) and of the total 7,094 (6,782) related to Chinese babies a figure which on the basis of registered Chinese births would give an infant mortality rate of 347.3 (454.9). Birth registration among the Chinese is far from complete but even if the defect is as much as 33 per cent. the resulting infant mortality rate would be in the neighbourhood of 260 per 1,000 live births—a very high figure. The non-Chinese infant mortality rate was 49.8 (88.3).

Europeans and Americans resident in the Colony were estimated to number 9,216 (9,012) of whom 7,121 (6,964) were British. Registered deaths were 149 (133) and the death rate 18.2 (14.7) per 1,000. Resident European officials numbered 935 (884) with an average number resident of 843 (800). Within this group 4 (6) deaths and 8 (8) invalidings were recorded.

Births registered in the New Territories (see this Bulletin 1935 Supp p. 189*) were 3,584 (3,380) and the birth rate 34.7 (34.9) per 1,000. Statistics of deaths appear to have been omitted.

Maternity and Child Welfare Work—The Tsan Yuk Maternity Hospital built and equipped by the Committee of the Western Chinese Public Dispensary was presented to Government by that Committee, and taken over by the Medical Department on the 1st of January. Including the four hospitals maintained by the St. John Ambulance Association there are now 18 (13) hospitals with 389 (274) beds for maternity cases. At the hospital training schools for midwives (see this Bulletin 1935 Supp p. 190*) 53 (39) candidates satisfied the examiners and were registered. The establishment of Government Midwives has increased to 12 (8) and during the year they attended 1,823 (1,605) maternity cases.

Two new Government Ante-Natal and Infant Welfare Centres were opened during the year. The Lady Ho Tung Welfare Centre built, equipped and presented by Sir Robert and Lady Ho Tung and situated in the New Territory was opened in May and the other the Ruttonjee Dispensary presented by Mr H. Ruttonjee was opened in January. Government also established, and opened in June, a new Infant Welfare Centre in Kowloon. Other centres continued to function as previously described (see this Bulletin 1935 Supp p. 190*).

At the Wan Chai Centre 1,584 (1,200) infants were under supervision and 18,812 (11,481) attendances were recorded, the corresponding figures for the Kowloon Centre (for seven months only) being 7,870 and 835 respectively. At their first visit the great majority of infants required medical treatment and, having regard to the fact that 68 per cent of them were wholly or partly breast fed it is remarkable that such a large number were found to be suffering from digestive ailments. At Tsan Yuk Clinic restricted to babies born in the hospital, new cases numbered 628 (498) and old cases 1,786 (1,495). In common with the rule at Tsan Yuk only babies born in the hospital are dealt with at the Alice Memorial Centre where 340 (336) first visits and 515 (579) return visits were recorded while at the Ante-Natal Clinic 216 (200) first and 87 return visits were made by expectant mothers. Attendances at the Tung Wah Centre totalled 2,291 (1,270), while at the Children's Clinic held twice weekly at the Kwong Wah Hospital, 2,670 cases were seen, in addition to the 259 cases attending the Ante-Natal Clinic.

School Hygiene—The personnel of the School Inspection Branch of the Medical Department was increased by two new appointments to the nursing staff. The number of schools controlled by the Education Department seems to be fewer in 1934 than was the case in 1933—viz. Government schools 20 (20) aided and subsidized 333 (322) and unaided 718 (737)—a total of 1,071 (1,079) attended by 73,949 (72,917) pupils. During the year 5,218 medical examinations were carried out in 14 Government schools and 8 private vernacular schools, the object being not merely to detect the sick and ailing in these

early stages but equally to note and treat anomalies of growth and development. The incidence of defects in need of treatment (excluding dental defects) varied with the type of school and ranged between 19 and 30 per cent of examinees (no details of defects are supplied in the Report). There are three minor ailment clinics for the treatment of Government school children and also special clinics for ear nose and throat cases and for visual defects. As far as possible activities are being extended among the vernacular schools. The appointment of a Lady Medical Officer in 1935 will make possible the extension of work among the girls' schools.

Public Health Sanitation etc—The complex machinery responsible for the Government organization of services maintained in the interests of Public Health and the anomalous arrangement under which the Sanitary Department functions as distinct from and independent of the Medical Department were commented upon in this Supplement a year ago. Having regard to the fact that in the Report for 1934 the sections devoted to the discussions of Public Health Sanitation etc. differ in no fundamental particular from the corresponding sections in the Report for 1933 repetition of the summary descriptions of various services appearing in the preceding issue of the Supplement are unnecessary on the present occasion (see this *Bulletin* 1935 Supp. p 191*). It only remains to say that the enactment of new ordinances now under consideration will rectify existing arrangements for they are designed to replace not only the *Public Health and Buildings Ordinance* of 1903 and the *Sale of Food and Drugs Ordinance* 1908 (the provisions of which are at present among the responsibilities of the Sanitary Department) but also portions of the *Merchant Shipping Ordinance* 1899.

Port Health Work—The staff employed on this branch of Medical Department work and the range of responsibilities and duties involved remain as previously described (see this *Bulletin* 1935 Supp. p 192*). The only differences between the contents of this section in the Report for 1934 as compared with that for 1933 lie in the direction of tabular statements relating to the volume of work accomplished. During the year under review 4,824 (4,815) British and 6,253 (6,641) ocean-going steamers entered and cleared the port and in addition to these were 9,748 (9,975) river steamers 6,547 (7,272) launches and 16,991 (22,089) foreign trade junks. Reckoned in terms of tonnage 40,054,033 (40,882,583). Hong Kong is one of the five greatest ports of the world and the responsibilities of the Medical Staff engaged in Port Health duties are unusually heavy. Ships arriving in quarantine numbered 350 (477) with 48,919 (73,474) passengers and crew personnel of 45,751 (41,335). All were medically examined passengers and crews from smallpox-infected ports being vaccinated if insufficiently protected against the disease. Formerly vessels were disinfected and fumigated by a private company, but from October 1934 Government took over this work. 55 ships were fumigated for destruction of rats and 13 on account of infectious diseases. Of the 133,240 (64,181) emigrants medically examined 265 (87) were rejected, principal causes of rejection being fever 152 cases trachoma 38 cases.

Hospitals Dispensaries Clinical Returns etc—In the absence of a general system of registration of sickness hospital returns of cases and deaths provide the only data which may serve as a means of

ganging the state of the public health in the Colony. With regard to Government hospitals the following additions to facilities described in the last issue of the Supplement (*Bulletin* 1933 Supp. p. 193*) may be noted.

At the Kowloon Hospital during the year a general block of two wards providing total accommodation of 48 beds a new block for the accommodation of additional staff of Sisters and Nurses, as well as quarters for a second resident Medical Officer were completed. Mention has already been made of the handing over as a gift to Government of the Tsan Yuk Hospital 60 beds are available, of which 46 are reserved for maternity cases, and 14 for gynaecological patients.

At the Government Civil Hospital, exclusive of maternity cases, there were 5,063 (5,113) in patients and of these 1,034 (901) were treated by the University staff the remainder by Government Medical Officers. Racial distribution of patients was Chinese 70.8 (66.4) per cent. Indian 20.8 (23.8) per cent. European 3.1 (8.2) per cent. and Others 3.3 (1.6) per cent. Hospital deaths numbered 317 (282) a case-fatality rate of 6.3 (5.1) per cent. Admissions to the Maternity Bungalow totalled 939 (912) and total cases treated 854 (832). Of the 705 (832) deliveries recorded 682 (620) cases were under the care of the University Professor of Obstetrics. Only 1 (2) maternal death occurred.

Out patient attendances at the Government Civil Hospital totalled 32,478 (51,925) these were exclusive of venereal disease cases.

At the Victoria Hospital (originally built for women and children, now a general and maternity institution) 430 (545) cases were treated, 17 (120) of these in the maternity block.

The Kowloon Hospital now accommodates 140 (92) beds, 48 having been added by the completion and opening of the extension in the middle of the year. Cases treated numbered 2,536 (2,321) Chinese patients accounting for 69.5 (63.9) per cent. Europeans 27.8 (33.1) per cent. and "Others" 2.7 (3.0) per cent. of the total treated. Out patient attendances were 32,311 (27,810).

At the Tsan Yuk Maternity Hospital there were 1,729 (1,292) cases with 1,582 (1,182) deliveries. Six maternal and 35 infant deaths were recorded. Out patient attendances totalled 6,004 (5,209) of these 1,887 represented new cases and the remainder return visits.

There are six Dispensaries and a Mobile Dispensary maintained by Government all are in the New Territories. The record of work reads New cases 15,150 old cases 19,845 maternity cases 845. The Travelling Dispensary treated 5,526 (10,523) new cases, of which 638 (766) were malaria. The decrease in numbers treated is attributed to the opening of the two new centres Lady Ho Tung and Sham Tseng.

The X-ray Massage and Electro-therapeutic branches continued to function successfully the increase of work noted in 1933 being well maintained.

The Chinese Hospitals (see this *Bulletin* 1933 Supp., p. 190*) additional to and not in substitution of the Government institutions fulfil useful purposes both in the field of medical relief and in the furtherance of health education.

At the Tung Wah Hospital reconstruction work is being undertaken, and a new block of 144 beds was opened early in the year the whole

accommodation now providing 451 beds. In patients numbered 11 151 (10,079) plus 1,320 (1 600) maternity cases and out patients 182 738 (208,264). At the Eye Clinic 13,883 (12 540) and at the Baby Clinic 2,291 (1,270) attendances were recorded.

At the *Tung Wah Eastern Hospital* there were 5,578 (5,240) in patients, exclusive of 954 (767) maternity cases and 81 071 (74,216) out-patients were treated. At the two *Tung Wah Hospitals* it is not without interest to note that though 83 per cent of out patients sought the treatments prescribed by Chinese mediums only 48 per cent of in-patients were treated under that system.

Conditions remain unsatisfactory at the *Tung Wah Smallpox Hospital* (see this *Bulletin* 1935 Supp p 194*) which for all practical purposes is controlled by the caretaker and the herbalist. 47 cases of smallpox were admitted and 18 deaths occurred.

In-patients at the *Kwong Wah Hospital* numbered for general diseases 8 735 (9,277) and maternity cases 4 406 (4 006) while out patients totalled 184 679 (155 000). At this hospital 23 per cent of in-patients and 75 per cent. of out patients were treated according to Chinese methods. Attendances at the Children's Clinic were 2,670 and at the Ante-Natal Clinic 259 (232) cases were seen.

Other Non-Government Organizations engaged in Public Health work were fully described in our last issue (see this *Bulletin* 1935 Supp p. 194*) and repetition is therefore unnecessary.

At the *Wan Chai Maternity Hospital* there were 857 (903) admissions and one maternal death.

The nine *Chinese Public Dispensaries* continue to function as previously described (see this *Bulletin* 1935 Supp p 194*) and during the year under review 348,817 (292 377) patients were treated, of whom 188,885 (165 661) were new cases.

The decline in the crude death rate from 22.1 in 1933 to 20.9 for the year under review suggests improvement in the general health of the Colony. Mention has been made of the fact that respiratory diseases account for approximately 40 per cent. of the total deaths due to all causes a condition of things largely due to overcrowding the widespread habit of expectoration among the people and poverty. The following comments relate to selected diseases treated in Government and Chinese hospitals. [It is to be remembered that since none of the insect-borne diseases is notifiable the true incidence of such diseases is unknown. How complete is notification of infectious diseases which have been made notifiable is not stated. The whole truth regarding incidence of disease among the population at large cannot be accurately deduced from hospital data alone. Furthermore registered causes of death for the Colony as a whole are by no means reliable having regard to the fact that the majority of decedents lack treatment by competent medical practitioners prior to death, and the Medical Officer examining such bodies with a view to determining cause of death, has no medical history to assist him in reaching a conclusion.]

Malaria has disappeared from the greater part of the urban districts but it still persists in the suburbs and in the rural areas of both the Island and the New Territories. In Government hospitals 474 (482) cases were treated, with 5 (8) deaths and in Chinese hospitals 915 (804) cases with 165 (208) deaths. [The figures for admissions to Government and Chinese hospitals quoted in the text of the Report

are at variance with those given in the Hospital Returns.] At Government hospitals the infecting parasite was determined in 95 per cent., and in Chinese hospitals in 94 per cent. of total cases treated, the types and percentages being. In Government hospitals, *P. falciparum* 51.1 (43.3) *P. vivax* 44.7 (32.9) and *P. malariae* 4.2 (3.7) and in the Chinese hospitals *P. vivax* 78.0 (42.2) *P. falciparum* 24.0 (57.6) and *P. malariae* 0 (0.2). At the Bacteriological Institute 2,386 (1,980) blood films were examined for the presence of malaria parasites, 1,629 (1,248) proving negative. Of the positives 51.8 (57.8) per cent. were *P. falciparum* 31.8 (24.4) per cent. *P. vivax* 10.6 (5.5) per cent. *P. malariae* 2.5 per cent. were mixed infections and 3.3 per cent. were unclassified.

Among the Police Force in the New Territories malaria admissions were 117 (102) and of these 83 were Indians, 15 Chinese and 9 Europeans. The experiment in the use of quino-plasmoquine at Tsui Wan Police Station (reputedly the most malarious station in the New Territories) was continued and the experiment seems to have been justified for the incidence of the disease has diminished. Total deaths due to malaria in the Colony and New Territories were 363 (414).

The spleen rate survey previously referred to (Bulletin 1935 Supp. p. 195*) was still in progress at the end of the year. Among 4,579 children examined 358 or 7.7 per cent. showed enlarged spleens, the highest rates being 41.4 per cent. at Castle Peak 34.7 per cent. at Sai Kung and 11.2 per cent. at Shatin. Among 556 children examined on the Islands of Lan Tau, Cheung Chau and Ma Wan, 2.7 per cent. showed signs of splenic enlargement.

The Malaria Bureau continued its investigations into the life history habits and carrying powers of the local anophelines, extending its enquiries to areas other than those mentioned in the Report for 1933. Dr JACKSON contributes a comprehensive account of the year's work the results of which were both interesting and instructive. As in previous years *A. sinensis* and *A. stephensi* were found to be important carriers of malaria (see this Bulletin 1935 Supp. p. 195* 196*).

Reported cases of cerebrospinal fever are stated to have numbered 246 (191) and of these 125 proved fatal. In Government and Chinese hospitals total cases treated were 189 (132) with 89 (52) deaths. The disease is most prevalent in spring dying down with the onset of high summer heat. Cases of diphtheria occur throughout the year though the majority of notifications are received between December and February 162 (122) cases were reported of which 82 (81) were fatal.

Smallpox cases were 153 (506) with 104 (433) deaths. Only 54 cases were treated in hospitals the remainder not coming to the notice of the authorities until after death had occurred. The majority of Chinese believe the herbalist treatment gives better results than do treatments prescribed by Western medicine though the statistics of the past 25 years disprove this belief. The vaccination campaign was continued and 298,838 (545,850) persons were vaccinated during the year.

Notified cases of encephalitis totalled 212 (207) with 61 deaths. Hospital cases numbered 153 (223) and of these 44 (27) were fatal.

of the total hospital cases 150 were typhoid and 3 paratyphoid fevers. Cases are usually sporadic and the source of infection seldom discovered. Government hospitals treated 158 (171) and Chinese hospitals 452 (616) in patient cases of dysentery 7 deaths occurring among the former and 138 among the latter patients. Classification of hospital cases gives for Government hospitals amoebic 12·0 per cent., bacillary 84·8 per cent undefined 3·2 per cent. the corresponding figures for Chinese hospitals being 23·9 15·9 and 60·2 per cent respectively.

For the fifth successive year no case of plague was reported. Systematic rat-catching was continued 175,687 (174,272) rats being collected during the year a result which suggests no diminution in the rat population yet none was found infected.

Broncho-pneumonia was the principal cause of death in the Colony 3,020 (2,955) deaths or 15·8 (16·3) per cent of all deaths being ascribed to this cause. Possibly some of the cases were of tuberculous origin. *Pulmonary tuberculosis* takes second place with 2,179 (2,225) deaths, or 11·0 (12·3) per cent of total deaths. Hospital cases numbered 2,244 (2,342) with 1,130 (1,265) deaths. Total cases treated in hospitals for all forms of tuberculosis were 2,818 (2,994) of which 359 (358) were patients in Government institutions. In the New Territories tuberculosis is not commonly met with.

Leprosy is a notifiable disease, yet the number of lepers in the Colony is unknown. A Committee has been appointed to enquire into the incidence of the disease in the Colony and to suggest the best means of dealing with the problem. Fourteen cases of *rabies* were reported four were human cases none had anti rabic treatment all were fatal. With the exception of one human case the disease was confined to Kowloon and the New Territories.

Beriberi was responsible for more deaths in the Colony than was malaria in 1933 and in 1934 yet the only information available regarding deficiency diseases is furnished by the returns of registered causes of death and hospital data. For reasons explained above these records are incomplete. Total deaths in the Colony due to this cause were 447 (463) and cases treated in hospitals totalled 616 (816) cases with 192 (223) deaths of the totals 551 (746) cases with 179 (220) deaths were recorded in Chinese hospitals.

Venereal Diseases—The established Venereal Disease Clinics continued to function at the centres previously described (see this Bulletin 1935 Supp pp 197-198*) The following information relating to new cases treated is supplied —

	Males	Females	Total
Syphilis	1,609 (1,649)	511 (483)	2,120 (2,132)
Gonorrhoea	702 (358)	327 (391)	1,029 (749)
Syphilis with Gonorrhoea	158 (122)	72 (122)	228 (244)
Chancroid	259 (132)	—	259 (132)
Others	1,078 (990)	863 (453)	1,941 (1,483)
	3,804 (3,251)	1,773 (1,489)	5,577 (4,740)

Of the total cases treated 92 (93) per cent. were Chinese.

The University Clinical Units under the Professors of Medicine, Surgery, and Obstetrics respectively continued their work as heretofore. In addition to accommodation allotted at the Government Civil Hospital, the Professor of Obstetrics has all the patients at the Tuen Yuk Maternity Hospital under his care and has available for his use between the two institutions a total of 65 beds for maternity and 22 for gynaecological patients. The Medical Unit treated 406 (429) in patient and 10,308 (10,906) out-patient cases. A special clinic has been established for cases suitable for treatment by artificial pneumothorax—the number of cases continues to increase. Chinese patients attending regularly for refills.

The Professor of Surgery reports that cases of nasopharyngeal carcinoma with hepatic stone formation and primary carcinoma of the liver are seen with unusual frequency at the Government Civil Hospital. In the Hospital Returns the following data are given. Cancer of buccal cavity and pharynx 36 cases 2 deaths primary cancer of the liver 7 cases 4 deaths in-patients totalled 487 (356) and out patients 3,510 (3,899). New cases seen at the Ophthalmic Out-patients Clinic numbered 2,489 (2,574).

Total admissions to the Obstetrical and Gynaecological Unit were 728 (888) deliveries numbered 682 (820). One (2) maternal death occurred after Caesarean Section on a patient suffering from general oedema and bronchitis.

Scientific.—The routine work of the Bacteriological Institute continues to increase, and the demands for more adequate accommodation become more insistent with the passage of time. The large and increasing volume of work and cramped laboratory space adversely affect research activities. Work on Flexner dysentery organisms and on culture media for the growth of the Klebs-Loeffler bacillus, continued. During the year under review 22,271 (16,918) specimens were examined. In addition to the blood smears already referred to under the heading *Velars*, above other work included the testing of 10,023 (8,257) sera for syphilis and 855 (923) for agglutination and the examination of 308 (274) spinal fluids for the presence of the meningococcus (of which 53 (51) per cent. were positive). Other cultural examinations included the examination of swabs for *C. diphteriae* of blood and faeces for organisms of the enteric group of milk and water samples etc.

Owing to an outbreak of canine rabies in the New Territories, the demand for anti rabic vaccine was heavy 4,309 (2,166) doses were issued and 403 (228) persons treated, of whom 211 completed the course of treatment.

Work at the Government Laboratory continues to fall into the three main classes mentioned in our last issue (see this Bulletin 1935 Sepp., p. 190*) analyses during the year totalling 3,723 (3,296) distributed as to official 2,893 (2,261) semi-official 206 (166) and unofficial 836 (849). Among other work of a special nature an investigation is in progress with a view to the determination of the composition of urinary stones occurring locally.

Financial.—The financial statement is a little difficult to follow. In one place total expenditure of the Medical Department is given as \$1,505,264 (\$1,414,081) and in another \$1,745,589 while total

Revenue of the Colony from all sources is quoted as \$31 731 650 and later as \$33 442 695 Cost of *all* services—e.g. Medical Sanitary Public Works Police Charitable etc.—is stated to have amounted to \$3,642,994 (£5 114 088). Ratio of this total expenditure to the revenue figure of \$33 442 695 would be 16·9 (15·5) per cent or exclusive of expenditure on Water Works 14 (11·8) per cent. These figures are approximate only accurate assessments being difficult by virtue of the overlapping of services.

PACIFIC OCEAN

Fiji and Western Pacific (1934)

The Colony of Fiji comprises some 200 to 250 islands of volcanic origin in the south Pacific Ocean (many merely uninhabited islets and rocks), lying between 15° and 22°S latitude and longitudes 177°W and 175°E. Sydney is about 1,700 miles distant and Auckland 1,400 miles. The Tongan or Friendly Islands lie 180 miles to the south-east and Samoa 500 miles to the north-east. The principal inhabited islands are Viti Levu with an area of 4,033 square miles, Vanua Levu 2,130 square miles, Taveuni 217, Kadavu 124, Koro 58, Cau 45, Ovalau 43, Rotuma 14 square miles. The total area of the Colony is 7,083 square miles (nearly that of Wales).

General.—The general health of the Colony for the first three-quarters of the year was exceptionally good, but during the last quarter a mild type of influenza was epidemic, notified cases increasing from 750 in 1933 to 2,274 during the year under review. Fijians provided 74 per cent of the cases reported. The Report also refers to an epidemic of whooping cough which swept through the Colony but though the outbreak was stated to be responsible for a considerable increase in the infant mortality rate and largely affecting Fijian infants no mention is made of the numbers of cases reported, nor of total deaths due to this cause but total cases treated in hospitals are returned as 158 with 15 deaths.

Vital Statistics.—The estimated population at the end of the year was 197,449 (193,239) a figure which included 98,479 (96,536) Fijians, 83,299 (80,901) East Indians and 4,763 (4,804) Europeans. Births recorded during the year totalled 7,198 (6,986) giving a general birth rate of 38.1 (36.0) per 1,000. Registered deaths numbered 9,054 (2,817) the crude death rate being 15.5 (14.7). The Fijian death rate of 19.8 was an increase of 2.1 over the rate for 1933 while the mortality rate of East Indians, 10.2 showed a decrease of 1.2.

There was an increase in the infant mortality rate 779 (592) infant deaths being recorded, giving a rate of 108.3 (83.3) per 1,000 live births. The increase was due to an epidemic of whooping cough which swept through the Colony and the deaths of 302 Fijian children alone were ascribed to this disease.

European Officials numbered 336 (325) with an average number resident of 314 (311). Six (5) were invalided and 1 (2) death was recorded. **Native and Indian Officials** numbered 403 (415) with an average number resident of 383 (394). None (0) was invalided, but 4 (1) deaths occurred within this group. Causes of invaliding or death are not stated for European or Native Officials.

Maternity and Child Welfare Work.—In the Obstetric Ward of the Colonial War Memorial Hospital births numbered 200 (175) and two (0) maternal deaths were recorded. At the Ante Natal Clinic only 17 attendances were recorded during the year the poor response being attributed to apathy on the part of the natives, who may suspect interference with native customs. Child Welfare work has however met with gratifying success, and the steady increase in the total native population is largely due to the successful efforts of Child Welfare Workers in districts and villages throughout the Colony. Senior

students and Post Graduates of the Central Medical School continued their village visits under the direction of the Acting Chief Medical Officer and received practical instruction in child welfare work.

The medical inspection of school children was continued provincial schools and the different Church Mission schools being regularly inspected by the District Medical Officer in each district. Among 35 pupils at the Girls Grammar School 10 were found to have enlarged tonsils and 9 with carious teeth. These are the only detailed particulars supplied concerning the results of school medical examinations the Report observing "the general health of the children was on the whole excellent."

Hygiene and Sanitation etc—The co-operative soil sanitation campaign between the Colony and the Rockefeller Foundation inaugurated on the recommendation of Dr HESSER, in 1929 and confined to the first instance to the island of Viti Levu largest and most densely populated island in the Colony has proved a most successful enterprise. In Viti Levu nearly 15,000 bore-hole latrines have been completed, and it is proposed to extend the system throughout the Colony. It will be necessary to provide for the regular inspection and maintenance of this latrine system or much of the time and money expended in their construction will be wasted if matters of cleanliness and repair are neglected. It is noted that demands upon the sanitary staff are already unusually heavy. Of water supplies and drainage the Report observes that these matters received more detailed attention.

Port Health Work.—Work concerned with the inspection and fumigation of shipping, deratization etc was continued as formerly. 144 incoming vessels were boarded, 106 inspections were carried out and 89 vessels fumigated during the year the rat rate per vessel averaging 0·4. In the Port and Municipal area 2,148 (1,697) rats were caught, of which 79·4 (58·5) per cent were *R. norvegicus* and the remainder *R. rattus*. 683 were submitted to the laboratory for examination, though none was found plague-infected.

Hospitals Dispensaries etc—In addition to the Central Leper Hospital and the Lunatic Asylum there would appear to be 17 Government hospitals, 32 dispensaries, 2 Mission hospitals and 3 hospitals maintained by the Colonial Sugar Refining Company. Admissions to and deaths occurring in hospitals in the Colony (see also this *Bulletin* 1935 Supp. pp 201*-202*) were as follows—

Hospital	Admissions	Deaths	Out patients
Colonial War Memorial, Suva	2,393 (2,509)	144 (161)	19,935
Lautoka	1,862 (1,860)	83 (81)	11,777
Levuka	269 (249)	10 (11)	3,486
Lambasa	522 (501)	29 (29)	8,944
Provincial Hospitals	2,393 (2,883)	135 (155)	49,794

Native medical practitioners in charge of dispensaries throughout the Colony treated 37,416 (36,975) cases with 261 (183) deaths.

Influenza was epidemic throughout the entire Colony though in mild form 2,274 (750) cases were reported, 1,705 cases being notified during the last three months of the year. Of the total cases recorded 1,682 related to Fijians.

Enteric Fever was responsible for 58 (196) cases, only four of these occurring in the Suva area—the steady decrease in the numbers of cases due to the disease especially in the Suva Urban and Rural areas is attributed to the intensive sanitary campaign which has been a feature of public health work. *Dysentery* also is definitely being eliminated from Suva by steadily improving sanitary conditions, but the sanitary conditions in some districts still leaves much to be desired. Out of a total of 399 (249) cases reported in the Colony only 35 occurred in Suva Urban and Rural areas. Hospital in-patient cases numbered 371 and 21 hospital deaths were ascribed to the disease. 31 (36) of these cases were treated in the War Memorial Hospital, 27 (32) bacillary and 4 (4) amoebic.

Cases of *diphtheria* numbered 18 (17) in 11 cases of sore throat, K.L.B. was isolated in more or less pure culture. There were no (4) recorded cases of *scarlet fever* only 1 (1) case of measles and 8 (4) cases of chickenpox.

In the returns of infectious diseases 9 (47) cases of *epidemic dropsy* are mentioned, 8 of them being stated to have arisen in the Suva Gaol. In another section of the Report it is stated that 18 cases of the disease were treated at the Suva Gaol Infirmary. Two (2) cases of *infantile paralysis* both in Indians were reported, one each from Nadi and Rewa districts. The first cases of this disease in the Fiji group were officially reported in 1883.

Cases of *tuberculosis* numbered 312 (351) of which 299 (313) were suffering from the pulmonary form of the disease Fijian cases totalling 164 and East Indians 110.

Helminths—Hookworm notifications numbered 338 (345) of the total 209 cases were reported from country districts, while out of 1,500 faecal specimens examined at the laboratory 24.3 per cent. were found to be infected with hookworm. Full details are not given of the incidence or prevalence of filariasis in the Colony (only 8 hospital cases are mentioned) but it is observed that an experiment proceeds with *Megakhae* the larvae of which are known to prey upon the larvae of *Aedes vexans* and other mosquitoes. Colonies of *Megakhae* bred in Suva have been distributed and are now well established only the future can determine what degree of success the experiment will achieve.

Fifteen cases of *syphilis* and 74 cases of gonorrhoeal infections appear to have been recorded of the 89 cases of venereal diseases reported only 6 related to Fijians it being observed that syphilis is not found among the native races in the South Pacific. Cases of jaws notified during the year under review numbered 1,667 (2,249).

Leprosy—In the returns of infectious diseases 52 (36) cases of leprosy are quoted as having been notified during the year but in the Special Report of the Medical Superintendent of the Central Leper Hospital, which appears as an Appendix in the Annual Medical Report it is noted that 89 (34) new cases were admitted during the year and that of these 65 were from Fiji itself 18 from Rotuma, 7 from Samoa, and 1 from Nine Island. Among the cases admitted during the year over 50 per cent were of the neural type only 2 showed extreme deformities and no case had reached the advanced cutaneous stage. There were 458 (476) inmates of the Leper Hospital, of whom 368 were males the principal racial groups being Indians 184 Fijians 142

and Solomon Islanders 46 the percentages of neural cases in these three groups being 36.4 52.1 and 50.0 respectively.

Indians in spite of apparently heavier initial infection show a much higher rate of improvement and a much lower proportion of cases advancing to extreme condition only 6.5 per cent. of Indians as compared with 16.2 per cent. of Fijians showing the advanced cutaneous condition. Dr Austin emphasizes the importance of the psychical factor in this connexion and suggests that a carefully planned scientific investigation might serve to explain these differences and point the way to further improvement.

Specific treatment has followed the lines discussed in the last Annual Report (see this *Bulletin* 1935 Supp. pp 202*-3*) Minor experiments were also carried out with certain of the aniline dyes but results were inconclusive and somewhat contradictory. These experiments are to be continued on a larger scale and results will be assessed with care.

With regard to the general results of treatment it is noted that 29 (31) were discharged during the year as having been free from active disease for at least two years. Of the 458 inmates examined at the end of the year 122 were quiescent or arrested cases—i.e. the combined total of inactive cases in each stage—182 were defined as improved and in 122 cases no change was noted.

Certain constructional improvements to hospital buildings were carried out during the year and a wireless telephone has been installed.

Special Reports—Dr CLUVIE Medical Superintendent of the Colonial War Memorial Hospital contributes three Special Reports (a) On the work of the Colonial War Memorial Hospital (b) on the Central Medical School Suva and (c) on Plastic Surgery in the Tropics. With regard to (b) it is reported that 36 (39) students were in training during the year 18 from Fiji the remainder from other administrations 7 students passed their final examinations in all subjects and, in addition 4 native medical practitioners received Post-graduate Certificates. The Rockefeller Foundation generously allocated a grant of £2,000 towards the erection of a combined Pathological and Bacteriological Laboratory.

In his Surgical Paper (c) after briefly referring to the earlier history of Plastic Surgery Dr CLUVIE emphasizes the importance of the procedure, which on a reasonably healthy subject carries in his opinion, no greater risk in the tropics than in more temperate climates. Describing the different kinds of tissue transplants which may be used, and methods of fixation and pressure designed to ensure successful taking of epidemic grafts he then proceeds to support his views by reference to a series of illustrative cases. The latter are described in detail—the case, anaesthesia, stages of operative procedure and final results being discussed at some length. The paper carries three photographic illustrations and a diagram demonstrating a method of adjusting lint bandage splint for penis in operation for elephantiasis scroti.

Bacteriological Laboratory—Reference has been made to the provision of a new laboratory in connection with the Central Medical School. The proposal, which involves the incorporation of the Bacteriological Laboratory with the new one should serve to contribute materially to the improvement of existing laboratory conditions.

During the year an attempt was made to determine the seasonal incidence and distribution of the various bacteriological types of dysentery in the Colony and to this end an outfit for the collection of faecal specimens, together with a circular of instructions as to methods to be adopted, was distributed to District Medical Officers and Native Medical Practitioners. First results of this experiment showed that the percentage of positive specimens varied with the district and was dependent to some extent to the degree of adherence to the instructions issued but continuance of the work should result in the accumulation of valuable epidemiological data. It is anticipated that recorded facts may demonstrate that Shiga dysentery is endemic, that periodic epidemics are endogenous, and that endemic foci exist which can be controlled.

At the request of the Senior Veterinary Officer a prophylactic vaccine for use against bovine contagious abortion in an infected district was prepared and 170 beasts were inoculated. It is stated the Government Veterinary Officer discusses the work in his Annual Report to the Director of Agriculture.

Routine examinations totalled 4,480 (3,996) and included 248 stools examined for dysentery organisms, 58 agglutination tests for members of the enteric group (*Bac. typhosum* the only organism implicated), weekly milk and water examinations and the examination of patients in the Colonial War Memorial Hospital for helminthic infestation. Of the latter 1,500 (1,500) specimens were examined the numerical and racial classification of results are not given, but percentages of parasitism were Hookworm 24.3 (25.5) Ascaris 7.7 (8.4) Trichuris 7.3 (9.2) Oxyuris 2.8 (3.6) and Trichostrongylus 1.4 (0.7).

The Report of the Western Pacific Health Service contributed by Dr D. M. LAMBERT provides an interesting survey of Public Health activities during the year under review. Limits of space prohibit even brief summary of the numerous branches of work dealt with—leprosy, tuberculosis, hookworm treatments etc.—for particulars of which the reader is recommended to consult the original Report. The greater part of the Report is devoted to describing the results of the two years co-operative yaws and sanitation campaign inaugurated between the Administration of Western Samoa and the Rockefeller Foundation, and concluded early in 1934. It opens with a brief historical summary dating from 1809 when Wilkes described the eruptive complaint known as *Hawaii* and continues the story by way of the later treatment of yaws in Samoa by European medicines down to the year 1931 and the inauguration of the Yaws Campaign under discussion. The first round of the Colony was commenced in April 1932, and completed in December of the same year. During that time no less than 58.8 per cent of the estimated population were examined, and of these over 60 per cent were infected. Coincident with the beginning of the work there occurred an epidemic of poliomyelitis which rumour mistakenly attributed to the yaws injections with the result that people did not present themselves so freely. In 1933 only 62 per cent of the estimated population presented themselves for examination, the infection rate then being 47.6 per cent, a decided improvement compared with the previous year though a good many cases were met with which showed considerable resistance to treatment. During

the campaign the authorities ran a series of Kahn tests to discover results of treatment with routine injections with neoarachphenamine when some curious effects were noted. 232 out of 1710 persons were negative on first test but after two treatments became positive on the third. 108 were negative on the first received two injections then were positive on the second and negative on the third test while 13 were negative on the first and second and positive on the third test. The conclusion appears to be that a single or even a double negative Kahn test is not necessarily conclusive.

The campaign greatly improved the yaws situation in Samoa but the necessity is emphasized of further and more prolonged treatment of yaws which evidently lies latent for months and even for years at a time. The Kahn tests destroy the illusion that yaws is a mild disease which a few injections cure.

Financial—Expenditure on the Department amounted to £74 480 (£71,027) a sum which represents 9.7 (11.7) per cent of the total Revenue of the Colony. If revenue creditable to the Medical Department be taken into account the net cost becomes 8.3 (9.8) per cent of the Revenue of the Colony.

British Solomon Islands Protectorate (1934)

The British Solomon Islands Protectorate is situated between the parallels of 5° South and 12°30' South and the meridians of 155° and 170° of East longitude. It consists of Guadalcanal, Malaita, San Cristoval, New Georgia, Isabel and other islands east of New Guinea with a total area of about 11 459 square miles.

Vital Statistics—No population estimate is given for the year 1934. The only data supplied are the census figures for 1931 and the births and deaths annually for the period 1930-34. It should be pointed out however that births and deaths figures relate only to six districts for the years 1933 and 1934 to five in 1932, and to four in 1930 and 1931. Births recorded in 1934 numbered 987 (1,264) and deaths 811 (731). If these figures are to be accepted then there were 27 fewer births in the six districts in 1934 than in 1933 despite the fact that in 1933 the records relating to one of the districts were for nine months only. That some sort of population estimates must have been attempted seems clear from the fact that birth and death rates for each of the six districts are given for 1933-34 while the percentage sex-distributions and sex ratios of the population in each of ten districts are also supplied though to which year these data refer is not stated.

Similarly the population figures for non-natives (European and Asiatics) are supplied only on the basis of the 1931 census figures and are useless for assessing the birth and death rates of these sections of the community in 1934. There are no records from which infant mortality rates may be calculated.

Of European Officials the total number resident during the year was 41 (42) with an average resident figure of 32.9 (32.2). No deaths were recorded either in 1934 or 1933. No official was invalidated during the year as compared with two in 1933.

The population of labourers is returned as 3,578 (3,583) among whom 23 (28) deaths occurred, giving a death rate of 6.4 per 1,000 (7.8). *Pneumonia* and *pulmonary diseases* (11 deaths) were responsible for 48 per cent. of the deaths of labourers. There was no recurrence of beriberi among indentured labourers, the outbreak during 1933 appears to have been due to "faulty" rice and not to rice as an article of diet.

Hygiene and Sanitation—Routine work was continued as formerly with the Native Sanitary Inspector making weekly inspections of houses, buildings, grounds, etc. Diesel fuel oil was found satisfactory for the weekly spraying and oiling of areas requiring this attention. Owing to shortage of prison labour no reclamation work was done, but a sanitary gang was engaged throughout the year in cleaning drains and ditches and in weeding and clearing underbrush. Sewage, water and other services remain as formerly described.

No cases of quarantinable disease occurred on any vessel arriving at any of the ports of entry—Tulagi, Faisi (Shortland Islands) and Peon (Vanikoro). The quarantine station was not used during the year.

Hospitals Dispensaries Clinical, etc.—Total admissions to the Tulagi Hospital numbered 700 of which 653 (483) were natives, 11 (12) Asiatics, and 36 (10) Europeans.

The general health of the community was not so favourable as in the two previous years. Epidemics of influenza and dysentery accounted for many deaths among natives while hospital admissions of natives showed an increase over the 1933 returns, largely due to the fact that an increased number of natives from other islands visited the Tulagi Hospital for treatment. Admissions to the hospital during the year were Natives 653 (434) Asiatics 11 (12) and Europeans 36 (38). Details of cases treated in the hospital tabulated by disease and cause of death for Europeans, Asiatics and natives separately are supplied and are commented upon below.

At the Auki Hospital 166 (137) native in-patients were admitted and 2 (1) deaths occurred. Out-patients numbered 1,581 (1,170). At the Faisi Hospital (Shortland Islands) 178 (125) in-patients were admitted. 3 (11) deaths occurred. Out-patients numbered 471 (334). No details of cases treated are supplied for either of these two hospitals.

In addition to Government hospitals there are two Mission hospitals subsidized by financial grants, and the supply of dressings and certain drugs by the Administration. From neither of these hospitals was a report received for 1934. The Missions also maintain small hospitals in charge of trained nurses.

The leper colony at Quaibalta which was closed in July 1933 has not been reopened.

Small native hospitals in charge of trained native dressers working under the direction of the District Officers are maintained at various Government district stations.

The Travelling Medical Officer paid his usual visits in the Department's vessel, *Hygiea* to Guadalcanal, Eastern Solomon Islands, Ngela, Savo, Isabel and the Russell Group. During these visits, though he found no unusual incidence of sickness, he treated 2,491 (2,261) natives and gave 2,338 injections of N.A.B. during the year.

Between the 1st January and 10th October the mileage covered by the Medical Department vessel was 3 543. During the year the Senior Medical Officer visited Nggela and Rennell Island.

Malaria was responsible for 83 (44) admissions to the Tulagi Hospital, these cases comprising 10 Europeans 1 Asiatic and 72 natives. In 82 of the cases the type of malaria is not defined though it is stated the predominant type is the subtertian with gastric symptoms the remaining case was one of cerebral malaria which terminated fatally—the only recorded death due to the disease during the year. The Report adds Atebrin was tried with varying results which have not been in accordance with results elsewhere. Many cases relapsed within a week of the completion of the course—one tablet three times a day for five days. Atebrin takes longer to reduce the temperature than quinine, and in a few cases it had to be stopped and quinine given intramuscularly. In many Europeans it caused nausea vomiting and acute abdominal pain and many Europeans have given up its use in the treatment of malaria. There is no doubt that Atebrin was effective in certain cases of malaria and with certain persons but, nevertheless, it is considered that quinine will remain the sheet-anchor in the treatment of malaria.

Two cases of *blackwater fever*—one European and one Asiatic—received treatment at the Tulagi Hospital no death was recorded from this cause.

Two outbreaks of *influenza* in the first and last quarters of the year were recorded both attended by many deaths among natives. Prece numerical description of the extent of these outbreaks is lacking the only information available being that 50 cases were admitted to the Tulagi Hospital (no death occurring) that 46 deaths were reported among natives on Choiseul from meningeal symptoms and 4 deaths were reported from the Marovo Lagoon.

An outbreak of *dysentery* occurred during the last quarter of the year though whether all Islands were affected is not stated. 161 cases were reported from Malaita, of these 8 were adult cases (with no deaths) and 153 children with 28 deaths. 3 cases occurred at Auki 24 cases were admitted to the Tulagi Hospital—1 European 1 Asiatic and 22 natives two deaths occurring among natives. Cases (number not stated) were reported from Guadalcanal with deaths number unstated among children while one death was reported from San Cristoval.

Of *tuberculosis* experience during the year nothing more is said than that 17 cases (all natives) were treated at the Tulagi Hospital with two deaths due to pulmonary tuberculosis among natives. Actually the yearly admissions were only 11 the other 6 cases relating to patients remaining in hospital at the end of 1933. Reference is however made to the Tuberculosis Survey carried out in 1933 by Dr S. M. Lambert Field Director of the Rockefeller Foundation at Suva Fiji, and the results of the survey are presented in an Appendix to the Report. Tuberculin tests made by the Mantoux method showed (a) a very high percentage of positive reactors especially in adult natives and (b) that the percentage of positive reactions increased with age. [A printing error seems to have crept into the published results of these tests, for the percentage of positive reactors in the age-group 0-6 should read 39.68 per cent. and not 79.68 as stated.]

Leprosy—As has been stated above the Leper Colony at Quailaita, Malaita operated by the Melanesian Mission in conjunction with their hospital at Fauabuwasi, closed down in July 1933 and has not been reopened. Survey on Malaita recorded 250 lepers, of which five were nodular cases the remainder being of the maculo-anæsthetic type. 200 of these cases have received treatment. The problem is receiving the attention of the Administration and a proposal is under consideration to obtain the services of an expert leprologist to make a survey and classify cases.

With regard to *venereal diseases* it is stated that syphilis has not been found among the natives but that 8 cases of gonorrhœa and 3 cases of granuloma venereum were treated at the Talagi Hospital during the year.

A special Appendix is devoted to reporting the work of the *Yaws and Hookworm Campaign* which still continues among the natives of the Protectorate along the lines described in this *Bulletin* (Vol. 32, 1935 pp 207*-8*) 1934 saw no change in methods of treatment, neosulphenamine being used in the treatment of yaws and carbon tetrachloride and magnesium sulphate in the treatment of hookworm. The Reporting Officer observes There is no doubt that the general health of the natives has considerably improved as a result of the yaws and hookworm campaign. The yaws infection rate has been markedly reduced. For 1934 the following details are appended 8,811 patients treated for yaws 12,823 injections given yaws infection rate 36.48 per cent hookworm treatments numbered 5,141.

Financial—Total medical and sanitary expenditure for the year amounted to £10,306 (£9,970) or 19.4 (17.2) per cent. of the total Revenue of the Protectorate.

Gilbert and Ellice Islands Colony (1934).

These islands formerly a Protectorate, were annexed to the Empire in November 1915. The Gilbert group lies between 4°N and 3°S. latitude and 172° and 177°E. longitude and consists of 16 islands, with several small dependent islets. The Ellice Group between 5° and 16°S. latitude and 176°E and 179° 58'W. longitude, comprises 9 islands. Ocean Island (Paanopa) is the seat of Government and was proclaimed British in 1900. Funafuti Island and to the north-west of it, Washington Island were included in the Colony in 1916 and Christmas Island in 1919.

Vital Statistics—Data for 1933 are not available for comparative purposes but for 1934 the following figures are supplied —

Territory	Popula-tion	Births	Birth rate	Deaths	Death rate	Infant deaths	I.M.R.
Gilbert Islands	28,816	875	31.0	686	23.7	135	177.1
Natives	22,283	—	—	2	—	—	—
Others	4,233	190	37.2	63	21.7	184	181.3
Ellice Islands	4,236	—	—	—	—	—	—
Matives	—	—	—	—	—	—	—
Totals ..	33,183	1,035	33.8	731	23.2	339	177.4

Among these totals were 209 Europeans in the Gilbert Islands and one in the Ellice Islands.

[In the Table of Population data the figures for the Gilbert Islands have been wrongly summed being returned as 26 715 instead of the true total 28,898 and Europeans in the Gilbert Islands as 92 instead of 209. In the returns of Births Deaths and Infant Mortality Ocean Island appears to have been omitted]

Maternity and Child Welfare Work—At present in the Gilbert Islands no Medical Officer is ever consulted by expectant or nursing mothers and confinements are conducted by native women. With the exception of such efforts as may be made in Mission Schools no organized child welfare work has so far been possible in these Islands. In the Ellice Islands on the other hand the Medical Officer and his staff have succeeded in training native girls as nurses who are carrying out good work among their own people.

Public Health Hygiene Sanitation etc—The general health of the community as a whole was good no serious cases of illness reported among Europeans. There is nothing to add to descriptions which have appeared under the headings of *Hygiene and Sanitation* in previous issues of the Supplement (see this Bulletin 1934 Supp p 166* and 1935 Supp p 209*) Mosquitoes continue a nuisance and the natives make little or no effort to bring about an abatement. It is thought these pests are not vectors of disease among the Gilbert Islands but in the Ellice Group filariasis and elephantiasis are common especially in the islands of Nui Vaitupu and Nuitao and control measures are attempted here and there.

Port Health Work—Ports of entry are Ocean Island, Tarawa, Funafuti, and Fanning Island. Forty nine vessels were entered at Ocean Island, 10 at Tarawa and 7 at Funafuti no returns being available for Fanning Island. No overseas vessels were placed in quarantine in Colony ports during the year.

Hospitals Dispensaries Clinical Returns etc—Two Government Hospitals are maintained, the Central Hospital at Tarawa in the Gilbert Islands and the Funafuti Hospital in the Ellice Islands there are also hospitals established at 18 island centres in the Gilbert and 7 in the Ellice Islands. The following particulars are supplied of hospital services—

Hospital	In patients	Out patients	Deaths
Tarawa Central	107 (170)	2,683 (3,732)	10
Funafuti Central	112	3,584	5
25 Island Hospitals	2,863 (4,001)	38,206 (25,433)	211

The Island Hospitals are staffed by Dressers from the Central Hospital in Tarawa and Funafuti two Dressers to a large hospital and one at each small centre. These men attend to in and out patient cases and make regular tours about the Islands for which they are responsible. Cases of sickness which cannot be treated locally are sent to the Central Hospitals as opportunity occurs. Ready-made mixtures for the more common ailments met with are supplied from the two Central Hospitals. Periodic visits for purposes of supervision are paid to each Island by a member of the senior or junior staff.

A small dispensary is maintained at King George I School Tarawa, for treatment of students therein one at the London Missionary Society School at Beru and a smaller one by the same Mission at Abaiang.

With regard to morbid conditions treated in the Colony during the year the following may be noted —

Influenza —A serious outbreak occurred at Tarawa in the Gilbert Group shortly after the arrival of two vessels at the Port local trading and other vessels carrying the infection to the Northern and Central parts of the group. "Local Traffic" quarantine restrictions were imposed upon vessels visiting hitherto uninfected islands, and this action proved successful in controlling the spread of the disease. Deaths directly and indirectly due to the epidemic totalled 73. No other data are supplied.

Tuberculosis —This disease though far from being eradicated is less of a menace than was the case a few years ago and it is reported that by comparison few fresh cases occur. The most common forms of the disease experienced are tuberculous adenitis in children and phthisis in adults. It is reported that Nui, Naitao and Vaitupu in the Ellice Islands show the highest incidence of tuberculosis among the islands in that group. Numbers of cases and deaths are not stated.

Syphilis continues to be non-existent, and only a few cases of *poisonous sores* are seen from time to time. The incidence of visible yaws in the Gilbert Islands is said to have declined markedly secondary manifestations now being rarely met with. 10,073 anti yaws injections were given at the various hospitals during the year.

Filariasis and *elephantiasis* are met with in the Ellice Group and are said to be most common in the islands of Nui, Naitao and Vaitupu. Vessels visiting the Gilbert Islands from places in which the mosquito vector of filariasis is present are required, under the Quarantine Ordinance to take measures to prevent introduction of the mosquito into the Gilbert Group.

Dysentery in adults and *caterpillar* in children are said to "occur frequently" *syphilis* is described as very common among infants and young children and many cases of *caterpillar conjunctivitis* are reported but no numerical details are supplied.

Precautions are taken to prevent the introduction of smallpox which has never visited the islands up to the present. An intensive vaccination campaign is being carried out. Up to the end of 1934 vaccination numbered 19,984 and only eight islands now remain to be treated.

Leprosy —Cases occur at all islands in the Gilbert Group but the disease appears to be non-existent in the Ellice Group. At the Lepe Asylum 31 inmates were treated during the year and 6 deaths were recorded. Treatment was by injection of moogrol andunction o Chaulmoogra oil.

In an Appendix to the Annual Report under review appears a separate Medical and Sanitary Report for Ocean Island. The average population is given as 2,130 births 58 deaths 80 and the infant mortality rate 43.38 per cent [The basis of calculation of the latter is not stated cf. *Vital Statistics* above.] The sanitation of the Island is reported as satisfactory there is excellent salt water sewage disposal for British Phosphate Commissioners' settlements and locations, as for the Banaban Hospital. Government staff are supplied with Kraustines or pants, while villages adopt the deep-pit system.

Hospitals.—There are two hospitals viz. the *British Phosphates Com
missioners Hospital* and the *Banaban Hospital*. At the former 1,247
cases were treated, comprising 45 Europeans and 1,202 Gilbertese and
Asiatics. 23 hospital deaths occurred among Gilbertese and Asiatic
patients. At the Banaban Hospital in patients numbered 298 with
52 deaths, while 1,542 out patients were treated.

Drought conditions may have been partly responsible for the fact
that the health of the community was less satisfactory. An epidemic
of beriberi occurred among Banabans Gilbertese labourers police and
prisoners, 157 cases with 29 deaths (of which 16 were infant deaths)
being recorded. Cases were of both 'wet' and 'dry' types an
acute cardiac form being responsible for the majority of the deaths.
The outbreak which commenced in April persisted until December.
During April also early signs of scurvy were noted amongst a few Bana
ban and Gilbertese indentured labourers but appropriate measures
were taken and the disease soon disappeared. *Dysentery*, both amoebic
and bacillary occurred sporadically.

Financial.—No details of Medical Department expenditure are
available.

WEST ATLANTIC

BAHAMAS (1934)

The Bahamas are a chain of coral islands lying between 21° 47' and 27° 34' N latitude and 72° 40' and 79° 5' W longitude and are the most northerly of the British West Indian Colonies with the coast of Florida to the north-west and Haiti to the south-east. There are about a score of inhabited islands of which New Providence is the chief and contains the capital, Nassau. The total area of the archipelago is 4,404 square miles or about half that of Wales.

General Statistics—The estimated population for the year under review was 63,763 (62,679). Registered births numbered 2,006 (1,831) and deaths 1,028 (1,145) the resulting rates being 31.1 (29.2) and 16.1 (18.2) per 1,000 respectively. The Report does not state whether all registered births were live births only or whether stillbirths were included.

Maternity and Child Welfare—The pre-natal clinic operated by the Roman Catholic Sisters and attended by a private practitioner continues to do excellent work. Attendances during the year numbered 891 (293). At the clinics of the Infant Welfare Association there were 2,607 (2,580) children on the registers, 11,916 attendances were recorded, and 3,040 house visits were paid to children in 2,241 families. During the year 579 (586) live births, 22 (30) stillbirths, and the deaths of 60 (70) children under one year of age were recorded, the I.M.R. being 103.4 (119.5) per 1,000 live births.

Public Health Sanitation etc.—No epidemic outbreaks were recorded. Attention is being devoted to the instruction of school teachers and children in the principles of hygiene and sanitation. The City's chlorinated water is now supplied to 1,020 (964) houses, and the number of standpipes has been increased to 50 (40). The sewage system has been extended and now 235 (225) buildings are connected. The City water and ice are analysed monthly and dairy milk periodically. Owing to financial stringency it was found necessary to reduce the staff of sanitary inspectors and street sweepers. Despite this handicap 32,134 house-to-house inspections were made by sanitary inspectors and a good standard of hygiene and sanitation maintained.

Hospitals Clinical Returns etc.—Admissions to Bahamas General Hospital were 2,233 (2,286) and 285 hospital deaths were recorded. In the Out Patient Department 23,718 (19,454) patients were treated.

The diseases treated in order of numerical importance were, venereal diseases, phthisis, enteric fever and pellagra. During the year several of the Out Island Medical Officers attended the Hospital in order that they might be made acquainted with recent advances in medical and surgical treatment.

Enteric Fever cases numbered 32 (10), the increase being attributed to increased rainfall (see this Bulletin 1935 Supp. p. 212* for incidence of the disease prior to 1931). During the year 4,710 (2,311) inoculations were given. Hospital cases of dysentery numbered 11 (8 amoebic and 3 bacillary) and of diarrhoea and enteritis 86 of these 31 occurring in children under two years. In this connection it is noted in the Research Section of the Report that many cases of dysentery appear

to be nutritional—i.e. pellagra! Orange juice prepared in the laboratory has been administered intravenously in 10 cc doses. It is observed Beyond demonstrating that it is a harmless procedure, it is too early to speak of results it offers some promise especially in checking diarrhoea.

Malaria is uncommon practically all cases being imported. Only 1 (1) hospital case was recorded. Ten cases of *dengue fever* were reported the first since 1922 and probably due to imported infection from Florida. No case of *smallpox* or *diphtheria* was reported.

Tuberculosis cases (all forms) numbered 102 and of these 80 (86) were pulmonary. The prevalence of the disease is entirely due to bad housing conditions and lack of proper ventilation.

There were 29 (47) hospital admissions for *pellagra* with 10 (9) deaths. Efforts are being made to stimulate the growing of vegetables and fruits on private plots for home consumption and in course of time vitamin deficiency diseases should be eradicated from the Colony.

Helminthic diseases are very prevalent the most common types of infestation being *Ascaris Oxyuris* and *Trichuris*. Approximately 2 per cent. of the population are said to be infested with *Filaria* *caesi* and recent research in the West Indies suggests *Culicoides* *giganteus* to be the vector. This mosquito is very prevalent throughout the islands.

Only two cases of *leprosy* appear in the hospital returns but nine cases were admitted to the Lazaretto making with those remaining at the end of the previous year 24 inmates of that institution. The report observes that both the nodular and anaesthetic types of the disease are met with the former predominating.

The *Venereal Diseases Clinic* continued to function as in previous years, 241 persons being treated for syphilis during the year. In the hospital returns 124 cases of syphilis 105 of gonorrhoea and 7 soft chancre are recorded.

Climatic bubo is said to be very prevalent but again no data are supplied. The use of Frei's antigen continued (see this *Bulletin* 1935 Supp. p 212*) to give satisfactory results its use enabled the diagnosis of a number of cases of esthiomene previously regarded as syphilis to be made.

Scientific—Work at the Government Bacteriological Laboratory is reported to have increased in volume and variety though no data are supplied other than those relating to treatments at the Venereal Disease Clinic. Reference has already been made under the titles helminthic diseases dysentery and climatic bubo to the work of the Research Section.

Financial—Expenditure on the Medical and Sanitary Department amounted to £24 408 (228 495) a sum which represents 8 2 (8 2) per cent. of the Revenue of the Colony during 1934.

BARBADOS (1934-35)

Barbados the most easterly of the West India Islands is situated in latitude $13^{\circ}4'N$ and longitude $59^{\circ}37'W$. Its length is 21 miles, its breadth 14, and it has an area about 168 square miles, a little larger than is, then the Isle of Wight.

Leaving the Colony four days before the completion of the year 1934-35 to take up his new appointment as Director of Medical Services in Northern Rhodesia Dr J F C HASLAM Chief Medical Officer prepared a Memorandum for the Annual Report for the year under review. Thereafter Dr James D ALLYRNE Acting Chief Medical Officer assembled data not available at the time of Dr Haslam's departure and supplied brief comments to supplement the Memorandum.

General — The rather unusual features of arrangements existing in Barbados for the care of the sick etc. remain as previously described, and repetition at length is unnecessary (see this Bulletin 1933 Supp pp 212* 213*) Dr HASLAM observes that the general sanitary organization of the Island remains unchanged. Not one of the 11 independent public health authorities has an expert adviser equivalent to a medical officer of health.

Total Statistics — The estimated population at the end of 1934 was returned as 182,440 (180,055). Registered births numbered 5,380 (5,316) and deaths 4,176 (3,593) the resulting birth and death rates per 1,000 persons being 29.4 (29.5) and 23.0 (19.9) respectively. Of the total deaths recorded 42.1 (42.7) per cent. occurred among children under five years of age.

Infant deaths totalled 1,378 (1,248) giving an infant mortality rate of 25.6 (23.5) per 1,000 live births.

Maternity and Child Welfare Work — The Infant Welfare Clinic continues to function as previously described (see this Bulletin 1933, Supp p 214*) Plans have been approved for the permanent housing of the Baby Welfare League and funds allocated by the Red Cross Society for this purpose. No data relating to clinic activities are supplied. The Register of Nurses and Roll of Midwives were published for the first time in January 1935 and contained the names of 237 nurses and 391 midwives. During the year the General Nursing Council received applications from 223 women for registration as midwives, 60 for registration as nurses and 187 for registration in both capacities.

School Hygiene — Here and there some improvement is noted in the hygienic deficiencies in public elementary schools, so strongly commented upon in the preceding Report. After referring to the commendable efforts made in some parishes to improve school latrine accommodation Dr Haslam notes indescribably filthy conditions in some areas and significantly adds It is a futile pretence for teachers to give instruction in hygiene in Government schools at which are provided for children latrines so insanitary that the children's parents might well be prosecuted for like conditions at home. Control of the schools should be in the hands of the Central Education Authority who would then be responsible for the provision and maintenance of proper sanitary arrangements. Under present arrangements no systematic inspection of school children is possible.

Public Health Sanitation etc—The reports of the six Inspectors employed by the General Board of Health and working under the direct supervision of the Chief Medical Officer are forwarded with appropriate comments to parochial authorities concerned. This service provides the Central Medical Authority with the means of maintaining touch with conditions in all parts of the Island. While the general sanitation of villages and settlements improves progress is slow and examples are not wanting of the persistence of nuisances for lack of adequate supervision and authoritative insistence upon the implementation of reformative schemes which only an officer possessing specialized training and definite status can make to the lay boards. Theoretically the 11 parochial authorities provide for the reception and care of cases of communicable disease but the arrangements so made are for the most part unsatisfactory.

Another course for Sanitary Inspectors was held during the year. Sixteen Barbadian candidates were successful in securing certificates of the Royal Sanitary Institute—viz as Sanitary Inspectors 10 as Food Inspectors 5 and Health Visitor 1.

Port Health Work—From the Port Health Officer's Report which is printed as an Appendix to the Annual Report the following items are selected. 1 180 (1 125) vessels arrived and were boarded. Of these 170 (210) were arrivals from infected or suspected ports medical inspection of all passengers and crews of such vessels being carried out. Crews of vessel arriving at Bridgetown totalled 61,994 (58,690) of which 35,568 (36,114) were medically examined. During the year 63 passengers and 16 seamen were placed under surveillance and 649 labourers and two stowaways sent to the Quarantine Station under observation. No case of quarantinable disease occurred among the shipping or in the Island.

Hospitals Clinical Returns etc—Government conducts a Leper Hospital and a Mental Hospital and finances but does not control an incorporated society which runs a general hospital. Government also finances a Venereal Disease Clinic Committee conducting a central clinic in Bridgetown and supplying medicaments to eight parochial clinics. This extract from Dr Haslam's Report typifies the anomalous arrangements existing in the Island. From all accounts the administration of the Barbados General Hospital leaves much to be desired. Between May 1934 and the end of the year there were four successive Chairmen, and among other notable happenings during their regimes two resident Medical Officers were dismissed. An English nursing sister was notified of the non-renewal of her contract there was a threatened strike of nurses the House Committee refusing to dismiss the ringleader despite the joint recommendation of the Senior Resident Surgeon and Matron that such action should be taken. No hospital statistics appear in the Report.

At the Mental Hospital there were 555 (529) patients in residence at the end of the year. At the beginning of the year under review there were 81 (87) inmates at the Leper Hospital there were 2 (7) new admissions 3 (2) re-admissions 3 (3) discharges, and 5 (12) deaths during the year. Approximately 3,838 persons received medical treatment in the 11 Parochial Almshouses in the Island.

The medico-statistical data presented in the Report under review and relating to sickness experience during the year are meagre.

regards mortality registered deaths are presented with distinction as to sex, age and cause for each parish in the island.

The Report observes: Both indigenous *malaria* and its conveying mosquito continue to absent themselves from Barbados. Infection by filaria is not now an important health problem. Indeed *filariasis* and *filarial elephantiasis* figure very inconspicuously in medical experience nowadays.

There were 118 (136) notifications of *enteric fever* with 26 (34) deaths. *Dysentery* was responsible for 99 deaths in the mortality returns the dysenteries are not differentiated, though the Report observes: Dysentery both amoebic and bacillary is encountered.

Notifications for *tuberculosis* numbered 83 (62) and 110 (118) deaths were ascribed to this cause. The increase in the number of recorded cases is attributed to improved notification. It is believed there is no evidence to support the belief that tuberculosis is an increasing menace in Barbados.

Only one (61) case of *acute poliomyelitis* was notified, but 2 (7) deaths were registered as due to this cause.

Infectious Diseases—No data are available from the clinics for the year under review. In the mortality returns *syphilis* is given as the primary cause of death of 434 (514) persons, and of these 340 (413) were under five years of age. Dr Haslam discounts the accuracy of these data, for in practically no case is diagnosis confirmed by laboratory test.

According to the mortality returns the following diseases appear to have exacted a high toll of human life in the Island: *Vesicular*, with 283 (211) deaths comprising 137 (109) male and 146 (102) female deaths. 142 (101) of the total deaths occurred in the parish of St. Michael.

Pellagra caused the deaths of 111 persons 90 of these being female deaths. No less than 676 deaths were attributed to *dysentery* and *enteritis* and of the total 547 occurred among children under five years of age. *Tetanus* was responsible for 50 deaths and malignant tumours for 106 deaths.

Bacteriological and Pathological Laboratory—Re-equipment and rearrangement having been completed the Colony now possesses an efficient bacteriological laboratory, so that for the future scientific investigation of public health problems becomes possible. The increasing amount of work which will now be undertaken by the Government Bacteriologist will preclude his assumption of responsibility for work of the Barbados General Hospital in addition to his proper duties.

Financial—Total expenditure on Parochial Health Administration amounted to \$71 939 (\$65,829) the returns include an approximate estimate for the parish of St. Peter. Sterling value of total expenditure reads £14,987 (£13 714). The cost of Parochial Poor Law Administration for the 11 parishes amounted to £41 020 as compared with £39 602 for ten parishes in the previous year (the parish of St. Peter in that year submitting no return). For 1834-35 the St. Peter parish expenditure was £1,847.

BERMUDA (1934)

The Bermudas or Somers Islands form a cluster of some 300 small islands in the Western Atlantic in latitude $32^{\circ}15'N$ and longitude $64^{\circ}51'W$. The nearest mainland is Cape Hatteras in North Carolina 550 miles distant. Most of the islands are mere rocks and less than a score are inhabited. The total area is estimated at 19 square miles.

Fatal Statistics.—Estimated population 30,937 (30,381) of which 13,136 (13,013) were white and 17,799 (17,368) coloured. Total live births registered numbered 862 (848) stillbirths 22 (29) and deaths 306 (314) the resulting rates being births 27.86 (27.91) deaths 9.89 (10.33) per 1,000 inhabitants and stillbirths 2.55 (3.42) per cent of live births. It is to be noted that the above rates are not in agreement with corresponding rates presented in the Report which erroneously excludes stillbirths among both births and deaths instead of excluding them from both and making a separate calculation for these data. Deaths under one year totalled 44 (60) giving an infant mortality rate of 51.04 (70.75) per 1,000 live births. The general birth rate is high and the yearly excess of births over deaths of 558 is higher than the Island can support (annual excess of births over deaths for the past three years is 523, 534 and 556 respectively). How this threat of over-population is being faced is discussed below under *Hospitals*.

Maternity and Child Welfare.—There are 39 registered midwives in Bermuda, 9 district nurses and 1 nurse for relief duty. The Bermuda Welfare Society reports that baby clinics are maintained in seven of the nine parishes. Membership of the society numbers 3,398 (3,372). 1,939 (1,815) pre-natal visits were paid during the year. 265 (235) maternity cases received attention and total visits (which do not include attendances at the baby clinics) numbered 23,041 (24,976).

Forty patients were admitted to the Home of the Bermuda Nursing Association during the year. 1,523 district visits were made and 124 out-patient treatments given.

General Hygiene and Sanitation.—Measures concerned with the destruction of rats, control of mosquitoes etc received attention. *Aedes aegypti* and *Culex* potential carriers of yellow fever and dengue fever are present in such numbers as to demand the serious consideration of the authorities. Dr F R Seymour of the Ministry of Health, London inspected and reported upon the Watlington Water Works. The Water Company are in process of building a second reserve tank for 400,000 gallons.

Dairies.—1,330 dairy cattle were tuberculin-tested during the year. 19 reacted to the test and were destroyed. Only about 50 head of cattle now remain untested and taking Bermuda as a whole the incidence of tuberculosis may be regarded as the lowest of any country which conducts systematic investigations. 28 cattle were tested for contagious abortion of which six were found to be infected. Regular meat inspection is proving a valuable check on the tuberculin-testing in the dairies and a warning of the hitherto unheeded dangers due to parasitic infections. Two Sanitary Inspectors took the course at McGill and satisfied the examiners.

Hospitals Dispensaries Clinical etc.—1934 was an unusually healthy year—no serious respiratory troubles only the mildest of epidemics and the lowest death and infant mortality rates recorded.

A new departure is marked by the proposed *Clinics for Marriage Counselling*. The problem of over population presses and the efficacy of contraceptive measures is to be given a trial at the same time men and women may seek advice on problems of inheritance, congenital defects, sterility etc. The experiment will be followed with interest.

Chickenpox 80 (15) cases and ~~smallpox~~ 52 (3) cases head the list of notifications of communicable diseases.

There were fewer cases of *diphtheria* reported, 14 (compared with 22 in 1933) and 2 deaths. There were in addition at least six malignant sore throats which did not prove to be diphtheria and therefore are not recorded though one of them proved fatal.

Tuberculosis notifications numbered 14 (15) though six of them were non-Bermudians. 9 deaths were ascribed to this cause, 7 of which were of persons of colour.

Five cases of *enteric fever* were notified, four from one family in St George's parish. It is observed that this family has long been the despair of sanitarians and an ever-increasing burden on the Overseer of the Poor. The mother died in this outbreak—the only death due to *enteric fever* recorded during the year.

Seven (8) cases of *scarlet fever* and 5 (8) cases of *measles* were reported. No case of smallpox was recorded. The situation in regard to vaccination appears to be becoming steadily worse. 335 vaccinations were carried out during the year compared with 407 during 1933. 166 parents sought exemption as conscientious objectors.

Leprosy—At the Isolation Hospital for lepers there were 11 inmates, no admissions or deaths during the year. The Leprosy Relief Association contributed a liberal supply of Moagrol. In the list of causes of death relating to persons aged five years and upwards, out of a total of 250 deaths 64 were ascribed to *Diseases of the Circulatory System*, 35 to *Diseases of the Central Nervous System*, and 32 to *Diseases of the Genito-Urinary System*. It is noted that 31 of the 64 deaths in the first of these three groups are stated to have been due to *Myocarditis* unqualified.

The Medical Superintendent of the hospital maintains a free clinic one afternoon a week for general diseases. The average attendance is about a dozen. Drs. Sweeney and Fournier supply similar services in their districts.

Port Health Work—There were 75,069 (59,800) visitors during the year of which 29,509 were on cruising vessels. No serious illness was met with on any of these ships. Upwards of 300 vessels were boarded by Medical Officers during the year. The duties of the Medical Department will be materially increased when, in the near future, Bermuda becomes an airport.

Among the special recommendations submitted by Dr. H. Wilkinson, Director and Medical Officer of Health, are the following:

- (1) Building regulations to insure against overcrowding of residences with resulting insufficient land for drainage. Provision of adequate water supplies.
- (2) Extension westwards of the boundaries of the city of Hamilton. Provision of roads, drainage, etc. in the area.

- (3) Re-organization of King Edward VII Hospital Preparation of plans for extension Provision of an isolation block and pavilion for tuberculous patients.
 (4) Establishment of dental clinic in the Eastern and Western Districts.
 (5) Regulations governing slaughter of cattle intended for human consumption.
 (6) Revision of present system of vital registration

Financial—Expenditure £14 055 (£14 122) has reference to two items only—viz. (a) Medical and Health Department £11 859 (£11,925) and (b) Isolation Hospital III £2 196 (£2 197). Expenditure during 1933 of £29,271 included cost of maintenance of King Edward VII Memorial Hospital Isolation Hospital II etc. details of these being absent from the 1934 Report

BRITISH GUIANA (1934)

British Guiana the only British Colony on the mainland of the South American Continent lies on the north-eastern coast. Its seaboard of about 270 miles extends almost from the eastern mouth of the River Orinoco to the River Courantyne and has to the north the Atlantic Ocean, to the south and south-west Brazil to the east Dutch Guiana and to the north-west Venezuela. Its area is approximately 89 480 square miles (a little more than England Scotland and Wales together) Its capital is Georgetown, the next most important town being New Amsterdam about 60 miles east of Georgetown.

Vital Statistics—The estimated population at the end of the year was 323 171 (321,280). Registered births numbered 9,301 (10 461) and deaths 7,980 (7,848) the resulting birth and death rates being 28.8 (32.6) and 24.7 (24.4) respectively. Infant deaths numbered 1,567 (1,613) the infant death rate being 163 (154) per 1 000 live births. Maternal deaths were for the Colony 122 (127) in public hospitals 42 (42) the resulting maternal mortality rates being 13.1 (12.1) and 35.9 (47.9) respectively. A comprehensive Table supplies a variety of demographic facts for each of the 28 registration districts in the Colony for the year under review and a further Table presents similar data for Georgetown and New Amsterdam for each of the years 1932, 1933 and 1934.

The following data are selected from those relating to the city of Georgetown —

	City of Georgetown	
	Municipal area	Registration area
Estimated population	63 080 (62,707)	64,931 (64,207)
Births	1,680 (1,619)	1,902 (1,861)
Birth rate	26.5 (25.8)	29.3 (29.0)
Deaths	1,360 (1,257)	1,461 (1,331)
Death rate	21.5 (20.0)	22.5 (20.7)
Infant mortality	151 (124)	145 (127)

The proportion of infant deaths in the registration area is returned as 273 (236) but the figures for the Municipal area are not separately stated. The population of the town of New Amsterdam is estimated at 9,206 (9,119). Registered births are stated to have numbered 252 (250) and deaths 213 (215) the resulting birth and death rates being 30.6 (30.7) and 23.1 (23.6) per 1,000 respectively. Infant deaths numbered 46 (36) and the infant mortality rate was 163 (129) per 1,000 live births.

The population of the sugar estates is not given, and the calculation of birth and death rates is therefore not possible. Registered births numbered 1,631 and deaths 1,114. There were 30 maternal deaths, the maternal death rate being returned as 18.4 per 1,000 births. The average mining population of the Maratini Diamond Fields for the year under review was 2,493—the number of births is not stated, but registered deaths were 35 as compared with 51 in the preceding year.

Maternity and Child Welfare—The disastrous floods experienced during the early part of the year gave rise to conditions prejudicial to maternal welfare. There was increased incidence of malaria and other debilitating diseases. Macrocytic anaemia affected a considerable number of expectant mothers with fatal results. This grave complication of pregnancy so frequently a cause of maternal death, is discussed at length in an interesting paper "Uogalactic Jaundice in East Indians" by Dr G. Gicquel which is published as an Appendix to the Annual Report under review. The British Guiana Infant Welfare and Maternity League continued its beneficial work and extended its activities in the county of Berbice. There are now 63 centres where clinics are established under the control of the League and where ante-natal treatment and treatment of sick infants are carried out. At these centres 3,900 infants were treated and 16,922 infant attendances for treatment were recorded. 1,281 expectant mothers made 3,123 attendances for purposes of treatment and advice. On the sugar estates infant welfare and ante-natal work represent very important phases of medical activity and are yielding excellent results but the statistics relating to this work in the Colony as a whole emphasize the necessity for ante-natal treatment, the education of mothers and obstetrical efficiency in the hospital and in the home. In the maternity wards of the five principal hospitals of the Colony (see this *Bulletin* 1935 Supp. p. 219*) 1,152 (1,133) deliveries were recorded, there were 1,002 (992) births and 36 (47) maternal deaths; there were 455 cases of diseases of the puerperal state treated in all public hospitals with 42 deaths. These hospitals are the training schools for nurses and midwives and during the year under review 25 midwives qualified by examination.

School Hygiene—The only information under this heading appears to relate to the dental treatment of school children attending primary schools and supplies details of the number and nature of the treatments.

Public Health Sanitation etc.—The new Public Health Ordinance which became effective in November 1934 provided for the establishment of a Central Board of Health responsible for the control of health and sanitation throughout the Colony and made provision for the amendment of various existing ordinances dealing directly or indirectly with public health.

The special remedial measures taken by the Medical Department in their efforts to cope with and ameliorate the sufferings and distress resulting from the unfortunate flood experience early in 1934 included the provision of temporary housing feeding in necessitous cases and the provision of milk at maternity and child welfare centres the construction of temporary buildings and emergency sanitary arrangements, the collection and disposal of dead bodies etc. Water borne and other epidemics so frequent, the sequelae of flood conditions did not occur though there was contamination of water supplies in country districts, a development which was unavoidable having regard to the fact that open fresh water trenches in such areas are separated only by road or dam from main drainage trenches.

With regard to sewage disposal dry pit latrines continued to be erected in villages in rural sanitary districts but the Department advocates the adoption of the septic tank system whenever financial considerations permit their installation.

There has been an extension of pipe-borne distribution of artesian well water supplies and standpipes erected at intervals along the more important village roads.

Routine inspection of shops and foodstuffs continued and milk samples taken at intervals in different areas. A brief reference has already been made (see Vital Statistics above) to the mining and sugar estate properties. In these areas sanitation has been fairly well maintained and there is evidence of a tendency towards the improvement of conditions in most instances.

Port Health Work—Quarantine was permanently maintained during the year against certain South and Central American ports for yellow fever plague smallpox and cholera. Quarantine restrictions were imposed at different times and for varying periods against certain ports in the Caribbean Sea for alastrim and against the Azores for plague. During the year the Port Sanitary Inspector visited 959 steamers and 748 sailing vessels. At varying periods during the year the trapping of rats was carried out with subsequent examination of rat carcasses no signs of plague were discovered.

Hospitals Dispensaries Clinical Returns etc—There are seven different hospitals in the Colony having a total of 892 (889) beds. Extensive repairs and renovations were carried out to some of the hospital properties, but much remains to be done in this direction. In-patients admitted to Government hospitals during the year numbered 19,143 (19,038) and 2,022 hospital deaths were recorded. The total number of patients treated at out patient departments of public hospitals was 61,640 (58,308). At the Mental Hospital in the county of Berbice 97 (83) patients were admitted 35 (59) discharged, and there were 101 (55) deaths during the year patients remaining on the books at the end of the year were 728. Accommodation in the hospital is inadequate especially in the female division.

With regard to special departments of hospital work it may be noted that in the ophthalmic department 4,406 (3,511) cases were treated and in the dental department of the Georgetown Hospital cases numbered 7,235 as compared with 6,348 in 1933.

In addition to the out patient dispensaries attached to the seven public hospitals, there are thirteen Government dispensaries in charge of qualified dispensers situated in the more remote parts of the Colony.

and in the mining areas. At these dispensaries 35,235 new cases, and 57,285 repeat cases received treatment during the year.

Hospitals and dispensaries on Sugar Estates and on Mining Properties were satisfactorily maintained. In estate hospitals cases treated totalled 20,049 (21,651) and recorded deaths were 827 (970). No corresponding data appear to have been supplied for mining areas.

Malaria.—Cases admitted to public hospitals numbered 2,364 (2,509) and 154 (167) deaths were ascribed to this cause. Of in-patient cases 315 were benign tertian 1 quarian, 34 subtertian 388

chronic malaria, and in 1,628 cases the type of infection was not differentiated. Among out patients 19,308 (10,987) were treated at out-patient departments of Government hospitals and dispensaries, these figures excluding the large number of cases treated at hospitals and dispensaries on sugar estates. *Blackwater fever* was responsible for 13 (6) deaths in the Colony as a whole and of the total deaths registered 3 (2) occurred in public hospitals where 10 (9) cases were treated. Ten of the total deaths in the Colony occurred in the county of Demerara.

At the Government Bacteriological Laboratory 1,364 (996) blood films were examined. Plasmodia were found in 17·9 (21·5) per cent. of these *P. vivax* being present in 83 (96) per cent. and *P. falciparum* in 7 (2·6) per cent. of positives.

The boronation of the Thomas Lands was continued (see this Bulletin 1935 Supp. p. 222*) and with the exception of one or two areas these lands may be considered "reclaimed" and are now available and, in fact, are used, for various recreational activities.

Enteric fever cases for the Colony were 315 (248) with 85 (89) deaths. In public hospitals 136 (96) cases with 41 (30) deaths, were recorded 134 of the cases being typhoid and one each paratyphoid B and C. There is little doubt that the higher incidence and mortality due to this disease were closely associated with the flood conditions experienced during the early part of the year. The dangers attending pollution of domestic water supplies were brought to the notice of the public through the medium of pamphlets printed in three languages emphasising the importance of boiling all water for household purposes before use. Deaths due to *dysentery* in the Colony numbered 235 (135). Cases treated in public hospitals totalled 183 defined as to 40 amoebic 7 bacillary and 136 unclassified there were 32 (20) hospital deaths due to this cause.

No case of *plague yellow fever smallpox* or typhus was notified during the year under review. Notified cases of *diphtheria* numbered 48 (30) and of the total 31 (21) notifications related to the city of Georgetown. Hospital cases were 34 (17) with 4 (7) deaths, and in the Colony as a whole 6 (7) deaths were registered as due to this cause. Mention might be made of the fact that during the year 565 (456) deaths were registered in the Colony as due to diarrhoea and enteritis, and that 449 in-patient cases, with 149 deaths and 890 out-patient cases were treated in public hospitals during the year.

Notified cases of *tuberculosis* (all forms) numbered 317 (385) with 253 (289) deaths, in the Colony as a whole. With regard to the above returns of notified cases it is observed that 456 (538) cases were treated in Government hospitals where 135 (165) deaths were ascribed to this

case and though the pulmonary form of the disease is not separately distinguished in returns relating to the whole Colony, 434 of the 456 hospital cases were pulmonary or laryngeal. As the disease (all forms) is notifiable in the Colony, it is a little odd to observe that the figures for notified cases are fewer by over 100 than hospital cases of phthisis alone. At the end of the year the Colonial Development Fund allocated £15,330 for the construction of a tuberculosis hospital. The pneumonias were responsible for 556 (712) deaths in the Colony, 228 (235) cases were treated in public hospitals lobar pneumonia accounting for 92 of these. Hospital deaths due to pneumonia and broncho-pneumonia totalled 149 (170).

Although six cases of beriberi are quoted in the hospital returns an outbreak of the disease occurred among the officers and men of the British Guiana Brazil Boundary Commission the first case arising in May 1934 and attributed to deficiency in the rice one of the staple articles of diet. Three more cases occurred within two months followed by five cases in September when one officer patient died and when at the end of October examination of all personnel was decided upon on account of the seriousness of the outbreak the toll read, seven cases six suspected cases two deaths. The Medical Officer to the Boundary Commission reported that both acute and subacute types were met with and the neuritic and oedematous forms all cases exhibiting moderate rise in temperature before the development of oedema and nerve lesions and a transient phase of polyuria before the occurrence of oliguria. With early diagnosis dietary readjustment etc. prognosis was good except in the acute type which was usually fatal. Recommendations for guidance of the personnel of the Boundary Commission when it resumes field work were submitted.

Leprosy—The Report of Dr F G Rose Medical Superintendent of the Leprosy Hospital calls attention to the dilapidated state of buildings and outhouses and the need for improving the general sanitation of the whole premises a programme of urgently recommended maintenance and reconstruction works is under consideration by Government among these being a proposal for the construction of a modern hospital of 40 beds fully equipped for the treatment of acute cases. The new Bishop Galton Memorial Home (see this *Bulletin* 1933 Supp. p. 223*) was formally opened in February 1934. There was no change in methods of specific treatment which continues to give satisfactory results. At the beginning of the year there were 296 (267) inmates then followed 55 (67) new admissions and 58 (59) re-admissions giving a total of 407 (393) leprosy patients treated during the year. Thirteen (18) deaths occurred.

Venereal Diseases—In-patient cases treated in public hospitals numbered for syphilis 861 (928) for gonococcal infections 696 (645) for granuloma venereum 88 (63) and for soft chancre 48 (60). Out patient cases were as follows Syphilis 1,203 gonococcal infections 1,125 granuloma venereum 35 and soft chancre 48 Extracts are quoted from the Annual Report of Dr E. G. H. PAYNE Medical Officer in charge of Venereal Disease Clinics who reports a decline in the number of new cases of syphilis and gonococcal infections—viz. of the former 904 (1,131) and of the latter 700 (877) and a slight decline in the total number of attendances. The view is emphasized that for the proper control of venereal diseases there is urgent need for

increase of medical and nursing staff. A grant of £3 125 from the Colonial Development Fund provides for the construction of a new venereal disease clinic to replace the present unsuitable premises. On sugar estates during the year under review 91 (42) cases of syphilis and 223 (177) of gonorrhoea received treatment. At the Bacteriological Laboratory 6,022 Wassermann Reactions were done, 5,997 on the blood sera and 25 on cerebrospinal fluids.

Other diseases calling for mention include the following. There was again an increase in deaths registered in the Colony as due to septicemia, and also an increase in the number of cases treated and deaths due to this cause in public hospitals—the Colony deaths totalled 573 (317), hospital in patients 538 (459), hospital deaths 159 (150) and out patient over 819 (778). With regard to cancer total deaths in the Colony were 113 (86) cases treated in hospitals 112 (97) and hospital death 48 (33). Tetanus was responsible for 32 (20) hospital cases, with 8 (13) death and diseases of pregnancy 1,578 cases and 42 deaths.

The work of the Ophthalmic Department continues to increase, 4,044 cases being treated as compared with 3,511 in 1933. In the Dental Department also out patient cases increased from 6,348 to 7,235. The 1934 estimates provided a sum of \$900 for the dental treatment of children attending Georgetown primary schools.

Special Reports etc—Appended to the Report under review are three reports of particular interest. The first discusses the activities of the Government Bacteriological Laboratory where 14,276 (13,841) specimens were examined during the year. The total, which is a record for the Laboratory would have been even greater but for a shortage in the guineapig supply which made it necessary to abandon Wassermann test for three weeks and curtail them on other days. As it was, Wassermanns represented over 42 per cent. of total examinations. The bulk of specimens examined, 64 per cent. were received from the Public Hospital Georgetown. By reason of the inadequacy and unsuitability of existing premises and smallness of staff, work is limited to routine examination of specimens. There is urgent need for the construction of a modern well-equipped laboratory.

In the second Appendix is reproduced a valuable report by Dr GIGLIUSCI on the Medical Reorganisation and Work on the Sugar Estates of Blairmont Bath and Providence during 1934. This report should be read in its entirety, for it provides an excellent example of how in the words of Dr GIGLIUSCI "by the systematic collection of data over an adequate period of time we may hope to obtain definite information on the local natural history of the principal diseases with which we have to deal. It is only on such exact knowledge that effective and economic preventive measures can be based."

And lastly in the third Appendix, Dr GIGLIUSCI contributes an interesting paper entitled, *Megalocytic Anaemia of East Indians in British Guiana*. This paper which discusses in great detail the results of investigations carried out over a period of 21 months in the three sugar estates mentioned in the preceding paragraph, calls attention to the high incidence of Megalocytic Anaemia among the peoples surveyed observes the disease to be a fruitful source of maternal, foetal and infant morbidity and mortality and one which must be regarded as of first rate social and economic importance. During the period of the investigation 51 cases were recorded among the

aggregate population of 4 127 Practically every case gave a positive indirect Van den Bergh reaction these anaemias thus resembling the Megalocytic Anaemias of Pregnancy described in temperate climates If taken in time the disease can always be cured by the administration of liver or liver extracts by marmite or by a combination of these treatments.

Financial—Total expenditure on the Medical and Health Department amounted to \$567 732 (\$554 625) a sum which represents 11 1 (10 8) per cent. of the total revenue of the Colony

BRITISH HONDURAS (1934)

British Honduras is on the east coast of Central America, with Yucatan (Mexico) on the north and north-west and Guatemala on the west and south and on the east the Bay of Honduras (Caribbean Sea). It has an area of about 8 598 square miles i.e. about the size of Wales.

Vital Statistics—The population of the Colony was estimated to be 54 744 (53 770) Registered births numbered 1,945 (1,942) with a birth rate of 35 5 (36 1) per thousand. There is no registration of stillbirths. Deaths numbered 971 (1 1f7) and the death rate 19 2 (20 8) 40 8 (40 1) per cent. of the deaths were medically certified. Infant deaths totalled 201 (242) and the infant mortality rate is stated to be 102 8 (124 6) per thousand live births. [On the basis of recorded data it should be 103 3]

Maternity and Child Welfare.—The activities of the British Honduras Infant Welfare League a voluntary organization, are restricted to Belize, where a weekly clinic is held 5,359 (4,918) attendances were recorded. The work is supported by voluntary contributions and lack of funds precludes extension of services to all districts. At the Belize Hospital 347 women (343 admitted during the year) were treated for diseases of pregnancy etc. 1,290 mothers and expectant mothers attended as out patients in connection with the Maternity Ward and 10 children for diseases of infancy (restricted to children under one year of age). Only one district Medical Officer—of the Orange Walk district—refers to this field of work by calling attention to the high infant mortality due, in his opinion to the poverty and ignorance of the people.

School Hygiene—There is little information under this heading the most extensive reference being supplied by the District Medical Officer Stann Creek who records monthly visits to the Government Industrial School, Pomona where periodic examinations of blood and faeces are made and weights regularly taken. In view of the emphasis on widespread poverty in the Colony it is of interest to note that periodic examination of schools by the District Medical Officer Stann Creek showed few cases of malnutrition. Elementary hygiene is taught in all schools.

Public Health Sanitation etc—Organization and administration of services conditions governing water supplies sewage and refuse disposal drainage and preventive measures taken in the interests of public health remain unchanged. These matters have been the subject of mention in previous issues and repetition is unnecessary (see this

Bulletin 1933 Supp. p 202* 1934 Supp. p. 183* and 1935 Supp. p. 227*) One additional recommendation for future work has reference to improvement of the streets of Belize.

Hospitals Dispensaries etc—At Belize Hospital, 1,186 (1,156) persons were admitted 1,217 (1,211) cases were treated, and 45 (83) deaths occurred during the year. In addition, 16,000 (12,271) out patient attendances were recorded. At the five district hospitals 1,353 (1,090) cases received treatment as in-patients and 20 (65) deaths occurred. The increase in the number of out-patients is attributed to conditions of widespread poverty and destitution resulting from the general economic depression.

Malaria—Recorded data considered in conjunction with the observations of the Senior Medical Officer and District Medical Officers, demonstrate that *malaria* dominates the pathological picture of the Colony subtertian infections being most commonly met with 578 (587) cases of the disease or 22 (25) per cent. of the total hospital cases received treatment in the public hospitals of British Honduras of the total certified deaths registered in the Colony 10·8 (9·3) per cent. were ascribed to this cause. 150 (206) cases of which 101 (150) were subtertian and 47 (32) benign tertian infections, were treated in Belize Hospital with two deaths. In the district hospitals 428 (381) in patients were treated with 27 (13) deaths in 267 cases the type of infection was not determined, the remainder being distributed as to benign tertian 52, subtertian 48 quartan 16 chronic malaria 23 and cerebral malaria 14. Included in these totals were 10 (14) cases of *blackwater fever* with 2 (1) deaths.

Fifty (50) deaths were certified as due to *tuberculosis* deaths due to this cause forming 12·9 (11·1) per cent. of total deaths certified. Mention is made of 31 (48) uncertified deaths, stated to have been due to consumption cough or cold. The Report refers to 50 (54) cases treated in the various hospitals in the Colony. Published returns indicate 54 cases 36 of which were *pulmonary tuberculosis* the form of the disease most common in the Colony. During the year 10 new cases were notified as against 5 in the preceding year.

During the year modified *smallpox* (Alastrim) made its appearance 51 (7) cases occurred in the town of Belize and an undetermined number in all districts except Toledo. There appear to have been no fatal cases. The usual measures wedded to an intensive vaccination campaign led to the gradual subsidence and eventual disappearance of the disease. 1,893 (1,282) successful vaccinations of children under the age of five years were carried out.

There was one case of *yellow fever* and 48 (68) cases of *dysentery* were treated in the various hospitals, with 2 (15) deaths. 36 of these cases were amoebic, 5 bacillary and in 7 cases the type was not determined. During the year the cause of 31 uncertified deaths was variously stated to have been dysentery diarrhoea and "bowels." Faulty conservancy methods are mainly responsible for the disease which is particularly prevalent in outlying districts.

There has been no case of *yellow fever* since 1921. Preventive measures as previously described (see this *Bulletin* 1935 Supp. p. 228*) continued to be applied.

Venereal diseases are still common in all districts, but it is difficult to persuade patients to continue treatment to permanent cure. No

precise information as to the incidence of venereal diseases seems available. At the Belize Hospital there is a Venereal Disease Ward of eight beds, which is always full. 81 cases were treated during the year at the various district hospitals 98 cases received treatment.

Helminthic infestations are common. *Ankylostomiasis* is pre-eminently the curse of the Indian riverine villages exceeded only by *ascariasis* both probably associated with pig rearing in those settlements which lack any suggestion of sanitation.

Financial—Medical Department expenditure amounted to \$77,299 (\$75,376) and that of the Central Board of Health \$11,662 (\$11,979). The total Revenue of the Colony is not stated.

JAMAICA (1934)

Jamaica an island in the Caribbean Sea about 90 miles south of Cuba within $17^{\circ}42'$ and $18^{\circ}32'N$ latitude and $76^{\circ}11'$ and $70^{\circ}23'W$ longitude. It is the largest of the British West Indian Islands being 144 miles long and 50 at its greatest breadth and having an area of 4,450 square miles or about half that of Wales. Kingston the capital, is on the south coast in the County of Surrey. The Cayman Islands and the Turks and Caicos Islands are dependencies of Jamaica.

Vital Statistics.—The estimated population at the end of the year under review was 1,104,775 (1,090,269). Births numbered 34,247 (35,668) with a birth rate of 31.2 (32.7) per 1,000 and deaths 18,731 (20,969) with a death rate of 17.1 (19.3) per 1,000. In the tabular presentation of deaths and causes of deaths *undefined fever* claims the greatest toll, with 2,467 deaths only 15 of these deaths being medically certified thereafter the principal causes were *congenital debility* 1,580, *infant convulsions* (0 to 5) 1,422, *pulmonary tuberculosis* 1,113 and *ill-defined causes* 1,036 of the last named only one death in the group was medically certified.

The infant mortality rates were For the Island as a whole, 181 (149) and for Kingston, 114 (137) per 1,000 live births.

Maternity and Child Welfare—The Division of Pre-Natal Work one of the many branches of activity functioning under the co-operative efforts of the Government of Jamaica, and the International Health Division of the Rockefeller Foundation distributes a set of nine monthly letters to expectant mothers describing normal changes occurring during pregnancy and dangers to be looked for and avoided. The names of such mothers are supplied to the Division by health officers, sanitary inspectors, nurses and social welfare organizations.

The Pre-Natal Clinic established at the Jubilee Maternity Hospital, was first opened in July 1934. Thenceforward the clinic was well attended, and it is believed among other beneficent results which must follow will be a decrease in the incidence of albuminuria 575 (500) cases of which were treated during the year. Admissions to this maternity hospital numbered 1,220 (1,195) comprising 900 married and 920 unmarried women. There were 1,143 (1,165) deliveries 1,065 were live births and 9 maternal deaths were recorded—i.e. a maternal mortality rate of 8.4 per 1,000 live births (or if the six cases stated to have been moribund on admission are omitted, the rate becomes 1.8 per 1,000 live births).

The Child Welfare Association in Kingston was increasingly active throughout the year the work of the association being further developed by the provision of a School Medical Officer and two School Nurses by the Kingston and St. Andrew Corporation.

School Hygiene—Out of 2,573 children examined by the newly appointed School Medical Officer of the Corporate area (see above) 1878 showed some form of physical defect and of these 178 were treated. One of the chief defects was *optic neuritis*. The School Dental Clinics now maintained in nine parishes, were established with the co-operation of the Rockefeller Foundation, though the latter has now ceased to contribute to these parochial centres. The only other information relating to school hygiene records that lectures and demonstrations in oral hygiene and school health are given, and that special leaflets, posters and placards are distributed to schools.

Public Health Sanitation etc.—The general health of the Island was much better in 1934 than in the preceding year the improvement being reflected by a decline in the death rate from 19.3 in 1933 to 17.1 in 1934.

Further progress was made during the year in taking over the activities established on a co-operative basis between the Government and the Rockefeller Foundation. The latter has now ceased to contribute to Parochial School Dental Clinics, and Government has assumed full financial responsibility for the Tuberculosis Dispensary (Brief summaries of the reports of the various Commissions are given hereafter). The Central Board of Health continued to assist the Local Boards of Health in the control of malaria, tuberculosis and yaws and to maintain the School Dental Clinics. The Laboratory is now accommodated in adequate buildings with facilities for work in separate departments and with this installation and reorganisation it has been possible greatly to extend the functions of the Laboratory in the direction of public health, free services now being offered to private practitioners for a wide range of routine examination of specimens.

With regard to *general sanitation* the officers of the Hookworm Commission working in conjunction with the Local Boards of Health carried out surveys on latrine maintenance in sections of selected parishes in some areas a high percentage of pit latrines were in a most unsatisfactory condition and though good progress was made in rectifying defects the importance of water-carriage installations is emphasised.

During the year a new Water and Sewage Board was created to control the provision of safe *water supplies* in the Kingston and St. Andrew Corporation, an official of the Rockefeller Foundation co-operating at the invitation of the Board with the field staff engaged in this work. Outside Kingston advice and assistance were given in regard to water supplies in various areas where sources of water are variable or abundant, but unsafe. Constructional work for piped supplies was commenced in the parishes of St. Mary (for Highgate and Richmond) and Manchester (for Parus) while funds have been allocated for constructional protection of minor rural supplies in the parish of St. Thomas.

With regard to *food supplies* conditions in respect of meat are as reported in 1933 (see this *Bulletin* 1935 Supp. p. 230*) except that

A slaughter-house has been completed for Montego Bay while the Manchester Board have under consideration proposals for slaughter houses for Mandeville and other towns. Steady improvement is reported in the sanitation of dairies and handling of milk in the Corporate area (Kingston and St. Andrew) and some improvement in other parishes.

During the year Vol. 9 of the *Jamaica Public Health* was published in edition of 20,000 copies being issued each month. 1,187 public health lectures, attended by upwards of 80,000 persons were given by medical officers of health and sanitary inspectors.

Recommendations for future work remain substantially the same as in 1933 (see this *Bulletin* 1935 Supp. p. 230*) though progress is noted in respect of some of them. Extra sanitary inspectors are required in view of increasing responsibilities in some parishes.

Port Health Work.—There was an outbreak of smallpox in an adjoining British Possession, and poliomyelitis appeared in Havana during the year but the Island remained free from quarantinable diseases during the year and no case of infectious disease arrived either by ship or by plane. There were 262 arrivals and departures of planes during the year the number of ships entering and clearing is not stated.

Special Commissions.—In previous issues of the *Bulletin* Supplement the work of the Special Commissions initiated by the Rockefeller Foundation has been described at some length and it is therefore unnecessary on the present occasion to do more than very briefly refer to the outstanding features of the work which continued during 1934.

(a) *Co-operative Public Health Work*.—Conducted by the Government with the co-operation of the Rockefeller Foundation these activities have carried the principles of preventive medicine into the homes of the people the success of the work is reflected in improved health and living conditions and a marked decrease in the death rate. Public health propaganda has spread to all parts of the Island with such effect that sanitation and disease prevention are recognized as important items of public concern and provision for their maintenance forms an item in the budgets of every parish and of the Central Government. The Colony has learned in fact that public health is purchasable, and that full realization of the benefits to be derived from health conservation can be found only in providing and maintaining well-equipped health departments. In this respect Jamaica now ranks high among the Colonies of the British Empire and above most tropical countries.

(b) *The Hookworm Commission*.—In January the office and staff of No 1 unit moved to the Cambridge area an area which forms the southern portion of the parish of St. James and which has a population of approximately 12,000. Of 11,263 persons examined 8,745 or 77.6 per cent were infected, 7,561 were treated and 7,122 were reported cured. Public lectures on hookworm and sanitation and microscopical demonstrations to schools were among the educational efforts directed towards the promotion of sanitary consciousness among the people. Unit No 2 continued operations in the Trelawny area and completed the programme of work after nearly two years of activity (see this *Bulletin* 1935 Supp. p. 231*). Pioneer and latrine construction work was started in the Riverdale section of East St.

Thomas-ye-Vale in the parish of St Catherine. Officers of the Hookworm Commission, working in conjunction with Local Boards of Health carried out surveys on latrine maintenance in several parochial areas. The insanitary condition of pit latrines is commented upon and the importance of developing water-carriage disposal systems, where possible emphasized.

(c) *The Malaria Commission*—Malaria occurred over a more extensive area in 1934 than at any time since 1928 and a programme of increased control measures was introduced. It was decided the Malaria Commission should function as a Department of Malaria, should investigate all areas of high malarial incidence, make such recommendations as were deemed necessary and should further see that responsible authorities implemented such recommendations. A careful study of death rates due to malaria in the Island is desirable, and steps are being taken to secure the further co-operation of district medical officers in supplying blood smears from their doubtful fever cases with a view to establishing a more precise assessment of the malaria death rate.

(d) *The Tuberculosis Commission*—During the first three months of 1934 the Rockefeller Foundation continued to support all units but at the beginning of its financial year (1st April) the Government assumed complete financial responsibility for the Kingston Dispensary and X-ray Laboratory. The Dispensary is well established as the centre and pivot of all tuberculosis activities in the Island.

During the three months the Rockefeller Foundation was responsible for the work 324 new patients and 1,262 old patients visited the Dispensary, nurses paid 1,779 visits to the homes of patients, 447 tuberculin tests were made on contacts, 676 specimens of sputum were examined and at the X-ray Laboratory 1,065 persons were examined. The Kingston Survey was completed the results of the Survey providing valuable information concerning the incidence and distribution of various manifestations of the disease in the city.

The Mobile Unit worked in the parishes of St Catherine and Portland and recorded observations making possible the establishment of dependable comparisons of conditions between rural districts and centres of population such as Kingston, Spanish Town, Montego Bay and Port Antonio.

One very important result of the work is the improvement in tuberculosis records. Prior to 1929 when the Tuberculosis Commission commenced activities each year more deaths than cases were reported. From 1930 onwards it may be noted that recorded cases steadily increased and the number of deaths due to the disease have steadily declined.

(e) *The Lays Commission*—The work organised by the end of 1933 (see this *Bulletin* 1933 Supp. p. 233*) was continued during 1934. *Unit No 1* carried on the campaign in three new areas comprising a total population of about 8,000 in the parishes of St. Mary and St. Catherine and continued control work in six areas previously treated and having a total population exceeding 10,000. New patients examined totalled 2,270. *Unit No 2* dealt with four new areas having a total population of 15,380 in the parishes of St. Mary and Portland, continuing follow-up control work in three other areas among a population of about 8,000. New patients examined numbered 3,450.

During the year these two units reached some 37 000 persons carried out 5 720 clinical examinations and gave 20 618 injections. During the re-surveys and follow up activities careful note was made of the results of treatments and much valuable information assembled.

The special entomological studies inaugurated towards the close of 1933 and concerned with the anatomy physiology and life-habits of the *Hippelates* flies were continued. Studies made during 1934 tend to show that *H. pallipes* may be the natural vector of yaws actual transmission of the disease from patients to rabbits has not yet been demonstrated.

The Research Unit continued the investigation of special problems and the Central Laboratory carried out the routine examination of serological specimens the preparation and sterilization of supplies for the field units and the maintenance of records and correspondence concerned with the activities of the Commission.

The special work on cardiovascular involvement in yaws the comparative studies made on the relationship of yaws and syphilis and pathological studies will be presented in the Report of the Yaws Commission for 1934. The following special papers have been submitted for publication —

Yaws in Jamaica—A plan of control based on Treatment by Drs Turner and Saunders.

Yaws in Jamaica—Epidemiology by Drs Turner and Saunders.

Wassermann Reaction in Malaria, by Drs Saunders and Turner

*The Duration of Motility of the Spirochaetes of Yaws in a Small West Indian Fly—*Hippelates pallipes* Loew* by Drs Kumm Turner and Peat.

*The Digestive Mechanism of one of the West Indian eye gnats *Hippelates pallipes* Loew* by Dr H. W. Kumm

Hospitals Dispensaries Clinical Returns etc —A further increase in the work of all institutions is recorded. In-patients at Kingston Public Hospital numbered 8 133 (7,351) 742 (821) hospital deaths were recorded. (In another part of the Report in patients are returned as 8,340 and 171,318 (162,257) out patients were treated.) At the District Hospitals 16 738 (16 578) in patients were admitted during the year 94 960 (63,892) out patients received treatment and 1 110 (1 156) hospital deaths occurred. Some of the hospitals had difficulty in accommodating cases and if the demand continues to increase the provision of additional accommodation will be necessary. The new Dispensary System established during the latter part of the year has already proved a boon. Free treatment is now available for about 80 per cent and cheap treatment for about 10 per cent of the population. Preliminary reports from hospital dispensaries show an increase of 300 per cent in the numbers of patients treated.

Separate reports are contributed by the Medical Superintendent Kingston Public Hospital, by the Visiting Surgeon, Jubilee Maternity Hospital, by the Medical Superintendent of the Lunatic Asylum the Medical Attendant of the Lepers Home and by the Medical Officers of prisons. The work of the first two of these institutions has been the subject of comment above (under Hospitals and Maternity respectively) and brief reference to the remaining three is necessary.

At the Lunatic Asylum there were 1 920 (1,873) patients under treatment at the end of the year the total number of patients treated

during the year being 2,407 (2,398). New cases numbered 528 (542) and 487 (525) were discharged or died, the deaths numbering 229 (282). With regard to Prisons of the 1,012 prisoners admitted to the General Penitentiary Kingston, during the year only six are reported to have been admitted in good health. Of the prison population, 521 received treatment as hospital in patients 11,208 as out-patients and 8 deaths were recorded. At the St. Catherine District Prison there were 532 prisoners in custody at the end of the year. During the year 568 prisoners received treatment as hospital in-patients, 1,042 as out patients, and 5 deaths were recorded. At the Industrial School, Stony Hill 883 inmates received treatment in hospital and 3 deaths occurred. The returns relating to the Lepers Home will be noted under *Leprosy* hereafter.

Notifications of cases of infectious diseases in the Island totalled 3,685 (2,939) the principal diseases being pulmonary tuberculosis 1,402 (1,241) enteric fever 1,360 (1,092) chickenpox 461 dysentery 333 and puerperal fever 38. Their distribution by parishes indicates that the ratio of notifications to population for pulmonary tuberculosis is highest in Kingston, St. Andrew, St. Thomas and Port Royal, and lowest in Westmoreland, St. Elizabeth, Hanover and Manchester. For enteric fever highest in Port Royal, Kingston, Trelawny and St. Andrew, lowest in Manchester, St. Elizabeth, Portland and Westmoreland, and for dysentery highest in Kingston, Port Royal, St. Andrew and Portland and lowest in St. Elizabeth, Trelawny, St. James and Clarendon.

Of disease experience during the year the following comments relate to the most outstanding features —

Pulmonary tuberculosis continues to exact a high toll of lives. During the year 1,402 (1,241) cases were notified and 1,113 (1,191) deaths were ascribed to this cause. In parishes showing the highest morbidity and mortality rates bad housing and overcrowding in slum areas are evident and such areas serve as foci for the dissemination of infection to all parts of the Island. Branches of the Anti-Tuberculosis League, a voluntary association established in 1927 are now established in all parishes with the exception of Clarendon and St. Ann (see also under *Tuberculosis Commission* above).

Malaria — Contrary to usual experience the rains of late 1933 continued into the spring of 1934 collections of water remained with the result that the first half of the year saw a wider distribution of malaria than has been seen in recent years. At the Kingston Public Hospital 882 in-patient cases were treated with 32 deaths at hospitals outside Kingston 4,077 in-patient cases with 121 deaths and 14,261 out patients and at Prison Hospitals 410 in-patients and 813 out patient cases. In the Kingston Hospital and Prison Hospital returns the type of infection is not differentiated, but in the County Hospital returns 93 per cent of in-patient cases were benign tertian and 53 per cent. subtertian infections, the proportion among out-patient cases being 98 per cent. and 13 per cent. respectively. There were 13 cases of blackwater fever treated at country hospitals with 3 deaths.

It is necessary at this stage to supplement the brief notes already recorded above of the activities of the Malaria Commission. From the special report which describes the year's work in great detail the following items have been extracted —

Paris Green used with success during months with low rainfall was only partially effective at other periods. It was replaced where necessary by ditching, cleaning of drains and banks of rivers followed by oiling and the filling of swampy areas with garbage. Larval catches in nine areas totalled 17,881 (19,232 in ten areas) of which 86.0 (84.0) per cent. were *A. albimanus* 9.9 (17.7) per cent. *A. grabhami* and 4.0 (1.7) *A. vexans*. Adult mosquitoes caught in the same areas numbered 9,246 (6,457 in ten areas) and of these 57.4 (55.5) per cent. were *A. albimanus* 26.2 (7.0) *A. crucians* 11.7 (17.0) *A. vexans* and 4.8 (10.5) per cent. *A. grabhami*. The following annual survey results are of interest —

Area	Blood examinations					Spleen examinations Percent enlarged	
	Number examined	Percent positive	Parasite infections per cent.				
			P. <i>vivax</i>	P. <i>falciparum</i>	P. <i>malariae</i>		
Caymanas	64	16.6	0.75	6.06	—	—	
Annotto Bay	100	22.0	3.79	12.83	—	8.0	
Montego Bay	100	6.0	3.03	—	1.52	8.0	
Vere	100	11.0	1.52	6.82	—	13.0	
Golden Grove	100	48.0	9.85	24.24	0.75	28.0	
Black River	50	42.0	6.06	—	9.85	22.0	
Falmouth	100	4.0	0.75	2.27	—	8.0	
Sav-la-Mar	100	11.0	1.52	6.06	0.75	18.0	
Little London	50	4.0	0.75	—	0.75	20.0	
Total	754	17.5	28.03	58.53	13.84	13.79	

With regard to *enteric fever* attention is called to the disquieting fact that there has occurred a steady increase in recorded cases and deaths since 1932. Some part of the increase may be due to improved recording methods yet the decline anticipated during the past four years has not been achieved. There is little doubt that the insanitary condition of latrines and unsafe water supplies in some areas are largely responsible for the high incidence of the disease. During the year under review 1,361 (1,092) cases were notified and 296 (223) deaths were ascribed to this cause. At the Kingston Public Hospital in patient cases numbered 372 with 73 deaths and at public hospitals outside Kingston 596 cases with 145 deaths. Somewhat disturbing increases in the number of cases notified, as compared with 1933 experience characterized some parochial areas—e.g. St. Ann 283 per cent. Hanover 233 per cent. St. Catherine 155 per cent. and St. Mary 118 per cent.

The dysenteries were responsible for 333 (249) notified cases while 105 deaths were recorded as due to this cause. Of the total cases 211 (196) were amoebic 45 (50) bacillary and 57 (80) were unclassified, the deaths being distributed as to 22 amoebic 6 bacillary and 77 undefined. Epidemics of amoebic dysentery occurred in the Kingston

Penitentiary and in the Lunatic Asylum, the outbreaks being attributed to fly-borne infection in both institutions. Penitentiary cases numbered 48 and Asylum cases 40.

Leprosy—Patients admitted to the Lepers' Home during the year numbered 34 (22) 7 (14) were discharged, 8 (3) absconded and 9 (14) died, and at the end of the year there remained 131 (119) inmates on the books.

At the Venereal Diseases Clinic at the Public Hospital, Kingston, 830 (752) patients were admitted to venereal disease wards, and 16,283 (10,692) received out-patient treatment. At public hospitals outside Kingston the figures read in patient syphilitic cases 1,013 (700) out patients 7,545 (5,892) for soft chancre in-patients 69 and out-patients 375 (155) for gonococcal infections in patients 1,188 (824) and out patients 4,007 (2,568). With regard to syphilis further investigations confirm the findings as to the distribution of the disease previously described—viz. that it is rare in dry lowland areas and common in the wet uplands of the interior (see this *Bulletin* 1933 Supp. 237-239). The Mobile Treatment Units (see "3 area Commission" above) have effected marked reduction of cases in areas of heavy infection, and the incidence has remained at a low level for the past two years. In some areas parochial staffs are not large enough to carry out the constant follow up work required in treated areas and in heavily infected districts the Mobile Units will continue to undertake original surveys and follow up work. Existing staffs of sanitary inspectors in less heavily infected areas have produced most favourable results, having reported 18,685 new cases during the year. For the rest it remains to say that 92,195 (37,240) treatments were given by District Medical Officers and 2,716 (10,781) by Medical Officers of Health to approximately 27,005 cases.

Training of Health Workers.—The Jamaica Government is aided by the Rockefeller Foundation in the training of medical officers and technicians in public health work. The School for Sanitary Inspectors has played an important part in the development of public health consciousness among the people for the Sanitary Inspector becomes more familiar with the people in their homes and has great opportunities for inculcating the lessons of public health and hygiene.

The Pathological Laboratory—The Laboratory is now accommodated in adequate buildings with facilities for work in the several departments. The work has continued to increase 27,379 (15,089) specimens being dealt with during the year an increase of 81 per cent. on the work of 1933. Of the total specimens received for examination 70 per cent. were from the Kingston Public Hospital, 10.2 per cent. from other institutions, 10 per cent. from health officers, 6.5 per cent. from country medical districts and 3.0 per cent. from private practitioners. As from 1st July the Laboratory undertook the routine syphilis serology of all patients admitted to the Kingston Public Hospital. During the year 8,842 (5,810) sera were submitted to Kahn or Wassermann tests. There was an increase of nearly 100 per cent. in the number of Widal tests—2,526 as compared with 1,477 in the preceding year. Blood examinations trebled in number with 3,319 (1,100) ^{and} than 1,635 (280) of these being smears examined for the ^{✓ ✓} of malaria parasites the smears showing a positivity of ^{✓ ✓} 25 per

cent. Stool examinations increased from 1 095 in 1933 to 1 762 during the year under review.

Financial—Total expenditure amounted to £191,341 (£178 151) a sum which represents 8 3 (8 3) per cent. of the total expenditure of the Colony. The Central Government spent £29 962 (£28,257) on matters pertaining to public health and the Rockefeller Foundation £8 404 (£10 912) the latter sum exclusive of the cost of salaries for the Director for Jamaica and five specialists on the local staff.

CAYMAN ISLANDS (1934)

The Cayman Islands three in number namely Grand Cayman, Little Cayman and Cayman Brac form a dependency of Jamaica and lie between 79°33' and 81°30'W longitude and 19°16' and 19°45'N latitude. They have a total area of about 104 square miles.

Vital Statistics—This short typescript of five pages makes no mention of the total population of the Islands. From the recorded births 172 (162) and birth rate 23·0 (26·0) per 1 000 and deaths 55 (156) and death rate 9 (25) per 1 000 the population calculated on the basis of natality data would be 6 143 (6,231) and if mortality data were used 6 111 (6,240). As compared with 1933 experience the numbers of births have declined, but deaths are fewer by 65 per cent yet the population appears to have decreased.

For the rest the Report sets out to show that the balance of health is again restored, despite the dreadful results of the storm of 1932 and that there has developed a change of apparent betterment in the people from a psychological viewpoint.

Disease conditions experienced during the year under review were characterized by no unusual features. Only 14 (40) cases of *enteric fever* were recorded with one death. The dangers incidental to the careless drinking of well waters during seasonal droughts are commented upon. Though no data are supplied the Report observes "no increase in the incidence of *malaria*" adding it would be prudent to remember that these Islands offer every facility necessary to bring about a complete decimation of the people if an outbreak of ordinary proportions were to appear. With regard to *bronchial disorders* Dr OVERTON says an accurate determination of the incidence of these disorders is a matter of dead reckoning as there may be hundreds suffering from bronchitis who may never receive or even require treatment. Only 1 (2) case of *tuberculosis* was under observation during the year and the hope is expressed that unless introduced from without in the near future the disease will be unknown in the Islands.

TURKS AND CAICOS ISLANDS (1934)

The Turks and Caicos Islands geographically are a sort of annex of the Bahamas group, but in 1873 were annexed to Jamaica which lies about 450 miles to the south-west. They are situated between 21° and 22° N. latitude and 71° and 72° 37' W. longitude, and have an area of about 166 square miles. The chief Island Grand Turk, is 6½ miles long, 1½ broad.

The Annual Report of the Government Medical Officer occupies but two sides of a single printed sheet. The general native population, 5 612, is not the estimated figure for 1934 but the total returned after the census enumeration of 1921. Registered births numbered 170 (205) and deaths 97 (120) and the resulting birth and death rates (on the basis of the 1921 census figures) 30·2 and 17·2 per 1 000 respectively. The numbers of infant deaths are not stated, but the infant mortality rate is returned as 105. On the basis of registered births this means that 18 (32) children died under one year of age.

The general health of the Dependency was fair. As regards sickness and mortality during the year the only quantitative statements have reference to hospital patients at Grand Turk 7 and deaths in hospital 3. For the rest malaria was only occasionally encountered there was an epidemic of *German measles* which invaded nearly every home on Turks Islands, as well as some of the settlements of the Caicos Islands while numerous cases of influenza of the gastric type occurred during the early months of the year. Tuberculosis was more in evidence than in 1933, attributed to lowered resistance due to extreme poverty which, in some cases meant a process of slow starvation ending in death. (In this connection the Report makes mention of unfavourable weather conditions giving rise to increased unemployment during this trying period food supplies of the poorer classes were lacking in nutritive value and variety and inadequate as to quantity.) No new cases of leprosy were reported during the year. No cases of primary syphilis and only a few cases of gonorrhoea. Of helminthic diseases the Report refers to a few cases of *ascariasis* and "widespread" infestation of *ascaris* and *oxyuris*.

As regards School Hygiene the regular dental inspection of children was carried out as before, 116 children receiving free treatment during the year. Hygiene instruction was given by school teachers.

In dispensary practice skin diseases were numerous, the number of *pellagra* patients remaining about the same as in 1933. Many infants suffered from digestive ailments, while among adults various forms of rheumatism diseases of the digestive system and nephritis were among the principal causes under treatment.

LEEWARD ISLANDS

Antigua (1934)

Antigua with Barbuda and Redonda forms one of the Presidencies of the Leeward Islands. It lies in W longitude 61° 45' and N latitude 17° 6'. Its circumference is about 54 miles and area 108 square miles or about half the size of Middlesex.

Vital Statistics—The data extracted from the returns of the Registrar-General read as follows. Estimated population 33,060 (32,424) live births 1,203 birth rate 36.39 per 1,000 stillbirths 81 (53) or 6.3 per cent of total registered births—a rather high figure. Deaths 569 death rate 16.9 per 1,000 Infant deaths excluding stillbirths 151 infant mortality rate 125.5 per 1,000 live births.

It is pleasing to note that the Chief Medical Officer calls attention to the misleading practice of including stillbirths with total registered deaths as presented in the Return of the Registrar-General. By correctly omitting the stillbirths Dr McDonald was able to show that the death rate in Antigua during 1934 was 16.90 per 1,000 and not 19.66 the latter an incorrect rate reached by erroneously including 81 stillbirths.

Maternity and Child Welfare—The three Government crèches and the one under voluntary management mentioned in previous reports continue to provide accommodation, nursing and food for infants up to two years of age the mothers contributing one halfpenny a day per infant for these services. An extract from the Superintendent of Nurses and Midwives supplies details concerned with the administration of the three Government crèches.

General Sanitation—Continued improvement in the sanitation of villages etc. is noted ponds streams and collections of water throughout the Island are kept stocked with millions though it is observed that when ponds become overgrown with weed and rank vegetation anophelines have still been found breeding therein. All temporary collections of water are oiled regularly. Sanitary inspectors make routine inspections of houses and carry out sprayings where necessary. The provision of adequate water supplies during seasons of drought is a paramount need. The filtration and chlorination plants provided under the Colonial Development Water Scheme have proved a great public health asset but future work should concentrate on augmentation of the water supply. Local climatic conditions during 1934 emphasized the importance and urgency of fulfilling this need—at Wallings the filtration and chlorination plants were idle for 111 days because the reservoir was dry at Body Ponds the upper dams were dry and scarce supplies from that station became contaminated and the supply from Mill Hill though of excellent purity fell short of estimated yield.

The Veterinary Surgeon reports that 3,101 animals were slaughtered during the year adding that a fair amount of tuberculosis is found at post mortem examinations of slaughtered animals in the public market. 268 cows were examined and certified as healthy to supply milk.

Daily routine inspections of cisterns latrines bakeries and dairies continue to be carried out butchers bakers and millers are required to submit themselves for medical inspection at quarterly intervals.

When the finances of the Island improve it is hoped to increase the present staff of seven sanitary inspectors employed in the country districts to ten.

School Hygiene—The Chief Medical Officer and District Medical Officers visited the schools at regular intervals. Hookworm infestation was heavy in some areas, the children in such areas being given mass treatment with Tetraform. Cases of *malaria* and *yaws* were treated. *Ulcers* continue to be the most common form of absence on grounds of sickness though poverty and long distances between houses and schools are factors of some importance in this connection.

Hospitals Dispensaries Clinical etc—There are four hospitals and 18 dispensaries in the Island.

1 At the Roseau Hospital 102 beds are available separate buildings house the Maternity Ward (16 beds) and the Tuberculosis Wards (10 beds). In-patients treated during the year numbered 1,449 (1,253) and out patients 1,772 (1,239). 100 deaths were recorded, of which 20 were ascribed to tuberculosis (18 to pulmonary or laryngeal tuberculosis). 7 deaths were due to *malaria* in nearly every case cerebral manifestations of subtertian infection. Excluding maternity cases (248) *casualty* cases 154 *ulcers* 126 and *malaria* accounted for the largest numbers of admissions.

2 At the Portsmouth Hospital containing 33 beds 330 (351) in-patients and 528 (463) out patients received treatment during the year. 27 deaths were recorded of which three were ascribed to *malaria*. *Malaria ulcers* and *external causes* were responsible for the largest numbers of admissions.

3 The Marigot Cottage Hospital provides six beds. 141 patients were admitted during the year—62 males, 79 females—and two deaths occurred. Principal diseases were *skin lymphatic system*, *malaria* and *injuries*.

4 The Grandbay Cottage Hospital has four beds. 78 patients were admitted—36 males, 42 females—and there were two deaths. Principal causes treated were *injuries* and *malaria*.

5 Attendances at the 18 dispensaries totalled 50,043 (48,851). 13,140 injections of arsenical and bismuth preparations were given for *yaws*, *syphilis*, *ulcers* and allied conditions.

In addition to the hospitals and dispensaries there is the Home for the Aged and Infirm at Roseau. This institution has accommodation for 30 inmates. 8 were admitted during the year and 5 deaths occurred, causes of death being senility 3, dysentery 1, and chronic rheumatism 1.

Diseases specially commented upon include the following—

Malaria—Climatic conditions were unusually favourable for anopheline breeding, and the disease showed considerable prevalence during the year. Some 3,300 (2,872) cases, many of them cases of relapse were reported by medical officers. 53 deaths were ascribed to this cause. Of 800 blood smears examined, 363 contained malarial parasites and of these 80 per cent. were subtertian, 13 per cent. quartan, 6 per cent. benign tertian, and 2 per cent. mixed infections. Admissions to the four hospitals numbered 212, and there were 11 deaths.

174 cases of all forms of tuberculosis were reported, malignant, the pulmonary type 56 (51) deaths due to pulmonary tuberculosis and 6 (4) due to other forms were record

in-patients for all forms of tuberculosis numbered 64 of which 44 were pulmonary cases there were 22 hospital deaths 19 of these being ascribed to pulmonary tuberculosis 15 (38) cases of *enteric fever* with 3 (7) deaths, were notified 10 of the cases and the 3 deaths occurred in the same district on the Windward Coast infected in 1933. *Dysentery* cases totalled 211 (198) and 6 (21) deaths were recorded. Of the 44 cases treated in hospital 28 were of the amoebic type of the disease. Of *diarrhoeal diseases* among children under two years of age no more precise information is given than that there were as usual, a large number of cases and that deaths in this group numbered 30 (32). No data are given relating to cases of *venereal diseases* reported during the year other than those contained in the Hospital Returns—a statement that 433 cases of gonorrhoea were treated by medical officers and that 29 deaths were ascribed to venereal affections. Hospital cases were in-patients 120 out patients 34. Of yours the Report states about 1 600 cases of this disease and its sequelae were under treatment and that the campaign for its eradication continues. The situation with regard to leprosy remains unchanged. Treatment by injection of Alepol or Moogrol is provided at dispensaries regular attendances being encouraged by the grant of small monthly allowances. Facilities for institutional treatment and segregations are however lacking. Of the 38 known cases at the beginning of 1934 two died but two new cases were discovered the 38 cases include 8 children between the ages of 5 and 15.

Helminthic Diseases—Infections due to intestinal parasites account for the largest proportion of cases treated by medical officers it is to be regretted that the number of cases so treated during the year is not stated. Ascaris and hookworm are exceedingly common. No less than 56 deaths during 1934 were ascribed to Intestinal Parasites though it is stated these figures are an exaggeration of the actual mortality due to this cause. [It would be more convincing if conjectures relating to this and other causes of ill health could have the undisputable support of collected figures.] Cancer was responsible for 19 deaths and *pneumonia* (all forms) 25 deaths.

No case of *smallpox* appears to have been notified during the year 2,198 (1,258) successful vaccinations were performed.

Financial—Expenditure on the medical services totalled £10 484 (£10,352) a sum which represents 20 per cent. of the total Revenue of the Presidency for 1934.

Montserrat (1934)

Montserrat named by Columbus after a mountain in Spain, lies in 16°45'N latitude and 61°W longitude, 27 miles S W of Antigua. Its length is 11 miles and its greatest breadth 7 miles and its area 32½ square miles.

Vital Statistics—The estimated population of the Island at the 31st of December 1934 was 13 161 an increase of 99 over the 1933 estimate. Registered births numbered 525 (478) and deaths 187 (189) the resulting birth and death rates being 39·1 (38·6) and 14·2 (14·5) respectively. Deaths of children under one year numbered 48 (38) the infant mortality rate being 94·3 per 1 000 live births as compared with a rate of 7 per 1 000 in 1933. No explanation of the cause of the increase in the numbers of infant deaths is provided.

General Health Conditions —The general health of the inhabitants was satisfactory. With the exception of a few summer cases of chicken-pox and a larger number of cases among children of gastro-enteritis in the autumn, there were no serious epidemics during the year. The cotton crop for 1934 was unusually large and should trading conditions continue to improve the standard of living will rise with resultant good effects upon the public health. The frequency and severity of earth tremors are a cause of much anxiety and nerve strain but the disagreeable fumes of sulphuretted hydrogen emitted from the soufrière appear to exercise no ill effects upon the health of the people.

Hospitals Dispensaries Clinical etc —At the Glendon Hospital 429 (417) in-patients received treatment and 13 deaths were recorded the numbers of persons who received out-patient treatment are not mentioned in the Report which speaks of the "large number" of such cases and observes that 1,027 injections for syphilis and syphilis were given during the year. Of the total in-patient cases 89 received treatment for *diseases of the skin and cellular tissue*, 36 for *diseases of the female genito-urinary system*, 34 for *diseases of the digestive system* and 32 for *respiratory affections*. Full use was made of the maternity ward, 189 confinements being recorded, maternal mortality rate nil. Only one case of *malaria* was seen type of infection not stated, and one case of *paratyphoid fever*.

Two cases of *leprosy* were reported. The first a case of acute generalized nodular leprosy was recorded of a former native of St. Kitts. Arrangements were made for his admission to the Leper Home there. The second case one of "nerve" leprosy in a young woman, is being kept under observation.

Fourteen deaths in the Island were ascribed to *tuberculosis* the cases being about evenly distributed among the three parishes. With improvement in the finances of the Presidency it is hoped to establish a tuberculosis ward for the proper isolation and treatment of patients.

Syphilis is not met with, but other venereal diseases are of frequent occurrence. A large number of cases of various manifestations of syphilis are treated at Glendon Hospital and at the country dispensaries. Attendances for treatment are however irregular and not persevered with to the standard of cure.

General Sanitation —The staff remains the same as in 1933—A Medical Officer and three Sanitary Inspectors the latter being responsible among other duties for the routine inspection of drains, latrines etc and the submission of quarterly reports to the Board of Health. New drains were constructed in various districts during the year pipe borne water supplies extended improvements made to three sources of supply two communal bathrooms erected at Plymouth, etc.

Financial —Medical expenditure amounted to £3,292, of which a sum of £1,147 was disbursed as medical expenses and £2,011 under the heading of "Hospitals" the latter including £940 spent on Outdoor Pauper Relief Boarding Pauper Inmates and the maintenance of Lunatics at Antigua. The ratio of medical expenditure to total Revenue of the Presidency is not stated.

St. Christopher and Nevis with Anguilla (1934)

The islands of St. Christopher and Nevis with Anguilla are part of the Lesser Antilles group and constitute one of the five Presidencies forming the Leeward Islands Colony in the West Indies. Their total area is about 150 square miles.

Vital Statistics—No census of the Presidency comprising St Christopher Nevis and Anguilla has been taken since 1921 but it is believed that the estimates based on the 1921 enumeration are reasonably accurate except for Anguilla where records of immigration and emigration are not kept. Total population figures for the Presidency are returned as 37,521 (misprinted 37,528 in the text) as compared with an estimated population of 36,888 in 1933. The distribution of population was as follows—St Christopher 18,787 (18,540) Nevis 13,373 (13,117) Anguilla 5,361 (5,231).

Live births numbered 1,416 (1,279) and the birth rate 37.73. Contributions of the three Islands were St. Christopher 850 (726) birth rate 45.2 (39.2) Nevis 376 (356) birth rate 28.1 (27.1) Anguilla 190 (197) birth rate 35.4 (37.6). Total *stillbirths* numbered 102 (96) the stillbirth rate for the Presidency as a whole being 7.2 per cent of registered live births. For the Islands the figures were St. Christopher 81 (71) Nevis 20 (20) and Anguilla 1 (5) the stillbirth rates being 9.5 5.3 and 0.5 per cent of live births respectively.

Total *deaths* numbered 803 (702) of which St. Christopher had 577 (503) Nevis 168 (132) and Anguilla 60 (67). Death rates for the Presidency and for each of the three Islands were 21.4 (19) 30.7 (27.1) 12.8 (10.1) and 11.2 (12.8) respectively. [What are the causes producing a death rate in St. Christopher so much in excess of those occurring in Nevis and Anguilla?]

Infant Mortality in the Presidency is high—256 (172) infant deaths were recorded, the infant mortality rate being 180.8 (134.1) per 1,000 live births. The figures for the Islands were St. Christopher 195 (131) Nevis 39 (26) and Anguilla 22 (15) the infant mortality rates for these areas being 229.0 (180.4) 103.9 (73.0) and 109.4 (76.1) respectively.

Maternity and Child Welfare—The individual crèches of the Baby Saving League are managed by voluntary workers under the supervision of the District Matron, a Government grant being contributed for the upkeep of these crèches. No further trained midwives have been appointed to the existing staff of 24. During the year 158 ante-natal visits were made 106 first visits to infants, 661 visits to midwives and 308 visits to crèches. 163 patients were admitted to the maternity ward of the Cunningham Hospital.

The Dental Surgeon visited every country school and village dispensary during the year visiting Anguilla in the spring and in the autumn. The general health of the children is reported to have improved.

Hygiene and Sanitation—Arrangements for the disposal of night soil in the poorer parts of the towns of Basseterre Sandy Point and Charlestown are not at present satisfactory financial restrictions having hindered the adoption of recommendations made for improvement. A large number of new concrete drains have been constructed in the town of Basseterre. Water supplies are satisfactory except as

regards certain villages in Nevis and Anguilla where conditions leave much to be desired.

Hospitals Clinical etc—With the exception of a severe outbreak of whooping cough which commenced in Basseterre in January spreading to the country districts and to Nevis giving rise to 2,229 cases and 72 deaths the general health of the Islands was reported to be good. In Anguilla, however the health of the community was reported to be only fair due to depressed economic conditions, while the Medical Officer of No. 6 District (Nevis) calls attention to increase in the incidence of tuberculosis.

Attached to the general report are the special reports relating to the four Hospitals the Leper House, Infirmary and Prison in the Presidency 863 patients were admitted to the Cunningham Hospital during the year (In the monthly summary these admissions are given as 2,921 a figure which includes the 53 patients remaining in hospital at the end of 1933) At the Alexandra Hospital 521 patients were admitted.

At the commencement of the year the Leper House housed 52 inmates 4 new cases were admitted and 4 deaths were recorded during the year in addition 28 extern lepers received treatment.

Malaria.—A total of 114 (93) cases was reported with 1 (3) death. Anophelines though present in Nevis have not yet been identified in St. Christopher and Anguilla in spite of daily communication between the islands the insects do not appear to have spread from one island to another All cases of malaria occurring in St. Christopher or Anguilla were imported cases or occurred to persons previously resident in malarial countries two cases of imported subtertian were reported from No. 2 District (St. Christopher) and several benign tertian from Anguilla. The Medical Officer of No. 6 District (Nevis) observed that though during the year there were no proven cases of malaria there were fevers with similar symptoms.

1,370 cases of syphilis 486 of gonorrhoea and 1,528 of yaws were reported, these three titles accounting for nearly 18 per cent. of the total reported disease incidence in the Presidency. It is stated that only three cases of *extreme fever* were reported, though it may be observed that 9 in-patients received treatment for this cause at the Cunningham Hospital and 1 at the Alexandra Hospital. Moreover the Medical Officer of No 3 District reports "I saw 16 cases." Dysentery was responsible for 65 cases with 2 deaths in no case was the bacillus of Flexner or of Shiga found on bacteriological examination. No case of smallpox was recorded 841 (1,824) vaccinations were carried out during the year.

With regard to tuberculosis the disease is said to be increasing it is doubtful, therefore whether recorded data 233 cases and 6 deaths, represent the true incidence and mortality due to this cause. It was observed that of 15 in-patient cases treated at the Cunningham Hospital 12 were of the pulmonary type. Unfortunately up to the present it has not been found possible to provide a special isolation hospital for treatment of the disease the spread of which is facilitated by prevailing conditions of overcrowding in small, ill-ventilated huts in which the poorer people live. The use of the laboratory as an aid to the diagnosis of tuberculosis has been disappointing of 21 specimens submitted 8 were positive for tubercle bacilli.

Helminthiasis.—The numbers of cases reported of helminthic infection form no criterion of actual incidence consisting as they do of those cases in which worms and no other disease were found but excluding those in which specific diseases were associated with helminthic infections. 261 cases of *filariasis* with 7 deaths were reported.

Laboratory—317 specimens were examined during the year of which 177 were serological examinations for venereal disease. The Wassermann test having been found unsatisfactory in a small laboratory working under tropical conditions the Kahn test was substituted as routine.

Financial—Total expenditure of the Medical and Health Department totalled £18 157 (£16,839) a sum which represents 17 (13 4) per cent. of the total Revenue of the Presidency.

Virgin Islands (1934)

A cluster of islands to eastward of and adjacent to Porto Rico the largest in the group belonging to Great Britain is Tortola, which is situated in 18°27'N latitude and 64°39'W longitude. The total area of the British Colony (consisting of about 32 islands) is 58 square miles.

This slender Report of four pages lacks important items of information which should characterize a Medical and Sanitary Report. No population figures are supplied, without which it becomes impossible to calculate birth or death rates or to attempt any assessment of the sanitary condition of a community. The number of *births* for the year under review is not stated, the only information under this heading appearing in the Hospital Returns where 33 maternity cases are noted 5 stillbirths and 82 deaths were recorded in the Presidency during the year.

General Health—As a direct result of depressed economic conditions housing and nutrition suffered, and the general health of the Islands was below its usual high standard. During September and October influenza broke out and spread throughout the Presidency. Many cases were complicated by pneumonia. Fly and water-borne diseases were almost non-existent though more petty ailments than usual were reported during the year. *Malaria* is said to exist in a malignant cerebral form (*P. falciparum* infection?) 18 hospital cases with 2 deaths were recorded, while 7 deaths due to *malaria* occurred throughout the whole Presidency the number of cases treated during the year is not stated.

WINDWARD ISLANDS

Grenada (1934)

Grenada, the most southerly of the Windward Islands, lies between the parallels of 12°30' and 11°55' latitude and 61°20' and 61°25' W longitude. Its length is 21 miles and greatest breadth 1½ miles and its area 133 square miles or about half that of Middlesex. Trinidad is about 90 miles south of it and St. Vincent 68 miles to the north-east, with small islands the Grenadines between them, part attached to the government of Grenada and part to that of St. Vincent. Carriacou, the largest has an area of 8,467 acres.

Total Statistics—The estimated population for 1934 was 83,888 (82,624). Registered births numbered 2,698 (2,688) and deaths 1,143 (1,179) and the resulting birth and death rates were 32.2 (32.6) and 13.6 (14.3) respectively. Stillbirths show a slight decrease as compared with 1933, 123 (134) being registered. Infant deaths numbered 311 (253) giving an Infant Mortality Rate of 102.0 (94.2) per 1,000 live births.

Maternity and Child Welfare—At the Maternity Department of the Colony Hospital 414 (334) pregnant women were admitted during 1934 and 314 (288) babies were born in the hospital. This Department is the training school for midwives and during the year seven nurses who had completed their training passed the Midwifery Examination and were granted certificates by the Medical Board, while seven probationer nurses are under training.

The District Nurses as part of their duties, visit and instruct mothers as to the correct method of bringing up their children, and excellent work is being accomplished in this direction. There are 17 nurses stationed throughout the Colony and their activities should result in bringing about a reduction in the infant mortality rate. During the year under review these nurses attended 1,011 (846) confinements and visited 1,599 (1,268) infants in their homes.

The Baby Welfare League continues to do excellent work, the trained Nurse Midwife employed by the League visiting mothers to advise on the care and management of children and supplying milk in necessitous cases.

School Hygiene—The usual school medical inspection work was continued throughout the year and though much good work was accomplished the provision of a whole time School Medical Officer would be more satisfactory and would probably lead to better results being obtained. In the follow up scheme introduced District Nurses make enquiries as to whether parents have carried out the treatments indicated and recommended by the Medical Officer during his inspection of the children where these recommendations have not been acted upon pressure is brought to bear to secure compliance. This action has been beneficial and it is believed that the health of the school children is distinctly on the up-grade. During the year under review 20,457 children were medically examined and 5,500 were recommended to seek medical treatment for worm infestation, dental defects, skin diseases and enlarged tonsils. Teaching of elementary hygiene is carried out in the primary schools.

Public Health Sanitation etc—Although influenza and whooping cough were prevalent 1934 was a comparatively healthy year the

death rate being 13.6 (14.3) which is the lowest death rate for the Colony on record. No diseases of unusual character in epidemic form can be attributed to insanitary conditions and no special preventive measures were necessary during the year.

Methods of sewage disposal remain primitive and open to objection. These matters are however receiving the attention of the authorities and it is hoped to provide a water borne system for the town of St. George in the near future. The communal latrines and dumping station erected in the town of St. Georges (see this Bulletin 1935 Supp. p. 251*) have functioned satisfactorily the question of extending this system remains in abeyance pending final decisions regarding the installation of a water borne system. In St. Georges and Grenville scavenging has been taken over by the respective District Boards elsewhere this work is carried out by the Sanitary Department. It is hoped in the course of time that other District Boards will follow the example of St. Georges and Grenville.

During the year the Sanitary Department carried out 107,860 inspections of markets, provision shops, ice and cold storage plants etc. and were engaged in the usual anti mosquito measures in urban and rural districts. The pipe borne water supplies of the Colony are adequate as to quantity and excellent as to quality.

The adulteration of milk sold to the public is believed to be widely practised, but it is hoped to introduce in the near future regulations governing supplies. On the other hand milk supplied under contract to the medical institutions maintains a high standard of excellence.

Training of Sanitary Inspectors.—Prospective candidates are required to undergo a period of training and to pass an examination before they are considered suitable for appointment. District Medical Officers and the Chief Sanitary Inspector give additional instruction to their subordinates and occasionally conferences are held and special instruction given at Headquarters.

Port Health Work—The usual quarantine procedure was followed in dealing with arrivals from non-Convention countries surveillance was especially imposed upon persons arriving from South American and Central American countries. 126 such passengers were dealt with and subjected to observation for periods varying from 1 to 16 days. Labourers proceeding to Cuba in search of employment are re-examined on return and, if necessary kept under surveillance.

Hospitals Dispensaries Clinical Returns etc.—At the Colony Hospital cases numbered 1,758 (1,557) and deaths 70. At St. Andrew's Hospital 263 (190) cases and 15 deaths and at Carriacou Hospital 415 (228) cases with 8 deaths. These figures make a total of 2,436 cases and 93 deaths but they are not in agreement with the hospital returns given as an Appendix in the Report for there the figures read cases 2,358 and deaths 90.

Malaria—During the year 6,701 cases were reported as against 5,408 during 1933 and there were 58 deaths as against 44 in the preceding year. The incidence of the disease was greatest in the first and last quarters of the year. Returns of cases showed increases in five out of the eight districts in the Colony and in District 8, which comprises Carriacou and Petit Martinique there were 897 cases as compared with 294 in 1933. Although the work of the anti-malaria

campaign is suspended, swampy areas in St. Andrews and St. Patrick have been drained and considerable work is in progress in other areas.

Notifications of *enteric fever* numbered 36 (32) and 6 (8) deaths were ascribed to this cause. (In the hospital returns 39 cases are recorded, with 5 deaths and in another place it is stated that 30 cases were treated at the hospitals during the year.) 1,201 contacts were inoculated with anti typhoid vaccine. One of the tabular statements and some of the text relating to enteric fever appears to have been misplaced, for it appears under the section relating to dysentery. Of *dysentery* only 6 (2) cases were notified, with 4 (0) deaths. The reduction in cases since 1928 has been little less than dramatic, and is attributed to the fact that dysentery has been made a notifiable disease and to the vigilance of the sanitary staff.

Influenza and *whooping cough* are stated to have been "very prevalent throughout the year" but the Report seems to make no further mention of these diseases nor does it give the number of cases other than the figures in the hospital returns where 2 cases of influenza received treatment.

Chickenpox of a fairly virulent type is stated to have prevailed throughout the year and to have been responsible for severe constitutional disturbances in adults but no data are supplied. *Malaria* assumed epidemic form during the last quarter of the year necessitating the closing of many primary schools and it is stated that in many instances there were grave complications with fatal terminations but no numerical facts are supplied.

There were no cases reported of *plague*, *yellow fever*, *cholera* or other dangerous infective diseases.

Pulmonary tuberculosis was responsible for 61 (54) notifications and 57 (64) deaths.

No fresh cases of *leprosy* were reported during the year. At the Leprosy Settlements there were 13 inmates.

Helminthiasis—*Ascarisis* is common but hookworm does not appear to be so prevalent as in some other West Indian Colonies. Cases of ascarisis numbered 10,903 and it is estimated that between 80 and 90 per cent of the children of all classes under ten years of age are sufferers from the disease. Cases of *oxyuriasis* numbered 1,843. In spite of the activities of the Sanitary Department soil pollution is rife even where latrine accommodation is available.

Venereal Diseases—Cases of *syphilis* under treatment numbered 451 (374) and hospital cases 16 as against 29 during the previous year. For gonorrhoea 514 (604) cases were under treatment in districts and 20 (17) cases in hospitals. It is hoped that a Venereal Diseases Clinic will shortly be established in St. George's. With regard to syphilis cases numbered 1,181 (1,336).

Financial—Total medical and sanitary expenditure amounted to £19,684 (£20,386). What proportion this represents of the total Revenue of the Colony is not stated.

St. Lucia (1934)

The Colony of St. Lucia is the largest and most northerly of the Windward Islands in the Lesser Antilles group West Indies. It is 27 miles long and 14 miles broad and has an area of 238 square miles or slightly larger than the Isle of Man.

Vital Statistics—Although this is the largest island in the Windward group the population is smaller than that of Grenada the estimated figure for 1934 being 63 804 (62 000). Registered births numbered 2,211 (2 068) and deaths 1 039 (1 115) the resulting birth and death rates being given as 32.8 (31.5) and 14.4 (16.1) respectively. Infant deaths were 223 (181). If the 114 stillbirths were included (wrongly) among the total registered births then the infant mortality rate would be 106.3 but if the 2,221 births are all live births the rate would read 100.9. [Stillbirths should be excluded from both natality and mortality figures. It was pointed out a year ago that the figure obtained by relating infant deaths to total deaths is not the infant mortality rate. This practice still continues it is noted.]

Maternity and Child Welfare Work.—There were 557 admissions to the Maternity Ward at the Victoria Hospital deliveries numbered 465 (468) and maternal deaths 39. The Child Welfare Association continued good and useful work. The usual clinics for children and expectant mothers were held at the Castries General Dispensary and at the Soufrière Dispensary (see this *Bulletin* 1935 Supp p 253*). At Castries 2,253 (2,281) new cases of infants and children were treated and 3,067 visits recorded, and at the Soufrière Clinic 1,614 children were seen. At the Dental Clinic free treatment was given to 82 children during the year.

School Hygiene—School premises continued to be regularly inspected by District Medical Officers and Sanitary Inspectors. It is stated that the medical inspection of school children though not actually provided for was undertaken by District Medical Officers as part of their routine work. No details of these inspections are provided. Hygiene is a compulsory subject in the curriculum of the elementary schools.

Public Health Hygiene Sanitation etc.—The general health of the community was satisfactory no epidemic outbreaks being reported. In the town of Castries sewage refuse, oil, etc. are collected, carried out to sea and dumped. The villages on the sea coast have oversea latrines and those inland pits. A strict supervision of all conservancy services is maintained by police and district sanitary inspectors. Water supplies remain as previously described (see this *Bulletin* 1935 Supp p 253*)

As an Appendix to the Annual Report the Senior Sanitary Inspector contributes a detailed account of the nature and extent of work undertaken in each of the six sanitary districts.

Port Health Work—Nineteen vessels arrived from overseas ports and were visited by the Port Health Officer no quarantinable disease was reported.

Hospitals Dispensaries Clinical Returns etc.—Various structural alterations and extensions were carried out during the year at the Victoria Hospital where in-patient cases numbered 2,644 (2,455) and 118 (115) deaths were recorded. Passing mention is made of cases referred to as the out-patient department but no details

are supplied. The Annual Report of the Victoria Hospital, which appears as an Appendix supplies very little information of the year's work and experience of morbid conditions. It is clear from the separate reports of District Medical Officers that dispensary services exist but very little information is forthcoming. From the reports relating to Districts I to IV it is not possible to determine how many dispensary cases were treated in those areas. From the reports relating to Districts V and VI it would appear that 3,262 cases in the former and 2,719 in the latter attended for dispensary treatment.

Malaria.—There was a considerable increase in the number of cases of malaria reported in 1904 as against 2,026 in 1903, Districts V and VI being mainly responsible with 1,950 (78%) and 847 (40%) cases respectively. Both of these districts are heavily infested with *A. fassiniatus* which breeds freely in the marine swamps characterizing these areas. For Districts I and III which are highly malarious, it is observed infections of various types and clinical expressions were observed, and District II reports a slight decrease, but no details are supplied from any of these three areas. The disease is not mentioned in the Report for the fourth district. The Victoria Hospital Report observes "74 patients were seen with malaria and of these 7 died." Types of infection appear to be ignored in the hospital and district reports with the exception of that relating to District VI where bloods examined showed over 50 per cent. malignant tertian parasites.

Dr EARL, of the Rockefeller Foundation paid a second visit to the Colony to see conditions during the dry season and to complete his malaria survey. As a result of his observations it is suggested that *A. erythritarsis* does not breed in the brackish water of marine swamps but prefers the fresh water of cane fields and inland ravines. Investigations continue with a view to determining whether this mosquito is one of the vectors of malaria here.

Malaria control work was actively continued, and included house-to-house inspections, canalization, clearing and calling, collection of larvae etc.

Only 5 (24) cases of extreme fever were notified, three occurring in District IV and only one case treated in hospital. Two cases of dysentery were also reported from District IV, the only cases occurring in the Colony.

Pulmonary tuberculosis was responsible for 78 (38) cases, 22 cases being notified from each of Districts II and VI and 9 from District I. The disease is said to be steadily increasing in the Colony and is attributed to the general poverty of the people and squalor of housing conditions. There is increasing need for a separate ward at the Victoria Hospital for the isolation of infective cases.

Helminthiasis.—Strict sanitary measures and constant treatment with oil of chenopodium are said to have improved the position with regard to helminthic diseases, 4,782 cases being reported as compared with 5,278 in 1903. With regard to local areas little change is noted in the position in Districts I and III. In District II incidence remains high, helminthic infections being held responsible for nearly 20 per cent. of all illnesses in the area. The District Medical Officer attributes the high incidence to the non-observance of a sufficiently careful personal hygiene, and the economic impossibility of the inhabitants to

wear boots or shoes *continuously*—the latter allusion having reference to the native habit of carrying their footwear and putting them on only at the entrance to towns. In District IV the Medical Officer reports 1,415 cases. In this district a survey of school children was commenced and though for various reasons only a proportion of the total school child population was examined percentage results of infection read *Ascaris* 0·85 *Hookworm* 12·0 *Trichuris* 15·0 and *S. mansoni* 5·5. With regard to the latter infection out of 48 adults examined 7 proved positive. *Fouadin* (neo-antimisan) an antimony derivative was used with conspicuous success in the treatment of cases. In District VI 947 cases received dispensary treatment for helminthic infections of various kinds. No new cases of *filariasis* were reported. An Appendix to the Annual Report provides details of the results of examination of 882 stools of patients (presumably hospital patients technique not mentioned) viz. *ascaris* 45·7 per cent. *hookworm* 28·6 per cent. *S. mansoni* 1·6 per cent. *Balantidium coli* 0·2 per cent. It is noted that 38·8 per cent of cases from Soufrière were infected with *bilharzia*.

Venereal Diseases—A centre for the treatment of venereal diseases was started in April and careful records were kept of patients attending. 1,092 (513) cases of *syphilis* and 546 (254) of *gonorrhoea* were recorded. Sequelae of gonorrhœa such as arthritis and stricture are said to be very frequently met with. No details of *chancroid* are supplied (except for District II where 4 cases were seen) but the Report observes: "This disease was much in evidence and most primary lesions consisted of a mixed infection. Of year 2,015 (1,964) cases were reported. In view of the great prevalence of gonorrhœal infections it may be mentioned at this stage that 12 cases of *ophthalmia neonatorum* were notified during the year (but in the Report for District IV alone 14 cases are mentioned). Newly-born children, whether at the Victoria Hospital or in out districts are treated with silver nitrate."

Cases of *leprosy* at the Leper Home numbered 31 comprising 23 males and 8 females. Alepol was used with good results.

With regard to other morbid conditions a few scattered cases of *chickenpox*, *influenza* and *whooping cough* were reported. *Ulcers* of all degrees are widespread and *bronchitis* a common respiratory affection.

Scientific—The Government Laboratory at the Victoria Hospital was reorganized and fully equipped during the year and a whole-time laboratory assistant appointed. Clinical material is dealt with and chemical and bacteriological examinations carried out (No details are supplied other than those relating to helminthic affections mentioned above.) The Castries Town Board contributes £50 annually towards the cost of milk and water examinations.

Financial—Approved estimates for the Department for 1934 amounted to £12,838 (£12,059) actual total expenditure being £12,034 (£11,437) or 14·0 (12·1) per cent of the total expenditure of the Colony.

Saint Vincent (1934)

The West Indian Colony of St. Vincent includes the Island of St. Vincent, the second largest of the Windward Islands and five of the Lesser Grenadines a chain of islands lying between Grenada and St. Vincent. The Island of St. Vincent is 18 miles long and 11 miles broad and has an area of 133 square miles or nearly that of the Isle of Wight the total area of the five smaller islands is some 17 3 square miles.

Vital Statistics—Up to and including 1933 vital statistical data presented in the Medical Report were taken from the returns of the Registrar-General. During 1934 the Department commenced independent compilation, with the result that some of the figures may be at variance with those in the reports of the Registrar-General.

The population was estimated to be 33,226 (32,006). Live births numbered 2,087 (2,133) stillbirths 118 (111) deaths 771 (679) and infant deaths 223 (155). The resulting rates were birth rate 39·2 (43·2) death rate 14·5 (13·1) stillbirths 5·6 (5·0) per cent. of live births infant mortality 109 (73) per 1,000 live births.

Maternity and Child Welfare Work—To the Maternity Ward of the Colonial Hospital 257 (257) cases were admitted, 217 (227) babies were born alive there were 21 cases of stillbirths, and 2 (4) maternal deaths. The work of the ante-natal clinic was continued as usual, though for some unexplained reason attendances declined considerably 55 as compared with 75 in the previous year.

School Hygiene—The usual quarterly visits of school inspection were made by District Medical Officers though neither staff nor facilities exist for any comprehensive scheme of School Medical and Dental Inspection. The Sanitary Department continues to be responsible for the erection and maintenance of school latrines.

Public Health Sanitation etc—With regard to sewage disposal, the demand for local water closets of the septic tank variety continues. During 1934 an average of two per month were installed. The Chief Medical Officer voices the opinion that as the requirements of better class residents are satisfied in this particular the demand for the abolition of the objectionable "bucket system" will grow weaker pit latrines are replacing the bucket type wherever possible. Refuse is disposed of by burning or trenching of incombustible material. Six new incinerators were erected in Kingstown. In many villages householders having nowhere to dispose of their refuse throw it into the streets as the Sanitary Department has no money for scavenging villages this practice gives rise to conditions prejudicial to health. Pipe-borne water supply services were extended in the Windward District which now has three separate pipe-borne water supply services. In the Kingston area the position is becoming acute by reason of the increasing numbers of water closets, and plans for increasing supplies are in process of preparation. In certain other areas supplies are at the risk of easy pollution and steps should be taken to provide clean water for the people. Houses erected under the provisions of the Building Regulations (1930) are relatively free from unhygienic features that characterized the average house in pre-control days, local architecture having undergone considerable improvement during the past few years. Labour conditions continue poor. The food of the masses is overwhelmingly carbohydrate in nature, meat being

rarely eaten except on Sundays. Persons engaged in the preparation and sale of food continued to be medically examined every six months and the usual routine inspections of premises by sanitary inspectors were made.

Port Health Work—The only information under this heading relates to places under quarantine in the Caribbean Sea and shipping dealt with in the port of Kingstown viz arrivals 3 012 departures 2 748

Hospitals Dispensaries Clinical Returns etc—At the Colonial Hospital in-patients numbered 1,309 (1,254) and at Chateaubelair and Georgetown 143 (134). Out patients treated at the Colonial Hospital totalled 585 (424). Attendances at the District Dispensaries were 39 174 (38 961) these figures being exclusive of persons treated by resident dispensers at Sandy Bay Bequia and Union Island the attendances in the South Grenadines were 2,021 (667) the increase being attributed to the appointment of a Resident Medical Officer and not to increase in disease incidence.

Malaria is not a major problem in the Colony the local vector *A. argyritarsis* is found chiefly along the coastal belt in the south west of the Island. 774 (950) cases of the disease were treated and 4 (10) deaths recorded. 28 (18) cases were admitted to hospital all of the subtropical type of infection, and 4 (6) deaths occurred. An outbreak of fever confined to a settlement known as Ashton in Union Island, gave rise to a large number of cases with a clinical history suggesting malaria three deaths occurred, attributable in the opinion of the Medical Officer to influenza. A comprehensive anopheline and malaria survey of the Islands is suggested with a view to definitely establishing the endemicity or otherwise of malaria.

Enteric Fever was responsible for 19 (8) cases with 4 (0) deaths of the total cases recorded 6 occurred in St. Vincent and the remainder (with three deaths) in Mustique an island dependency of 100 persons lying some distance from St. Vincent. The quality of the water drunk by the inhabitants of Mustique is characterized as deplorable, and the people are said to suffer from a fever in dry seasons sanitary conditions are primitive and latrine accommodation almost non-existent. Effective measures were taken 98 persons were inoculated and of this number 74 received two inoculations.

There were 60 (73) cases of tuberculosis with 48 (54) deaths *pulmonary tuberculosis* was responsible for 49 (62) of the 60 cases and 44 (50) of the 48 deaths. During the year 19 female patients were treated at the Tubercular Home there being no institutional accommodation for male sufferers other than that provided by the general wards in the three hospitals. *Influenza* claimed 724 (1 866) cases with 5 (11) deaths.

Whooping cough gave rise to 731 cases with 15 deaths *measles* 198 cases with no deaths and *chickenpox* 77 cases also with no deaths.

The fight against *yaws* continues 5 632 cases were recorded and 19 329 injections given. The incidence of the disease, the chief cause of disablement among the labouring classes appears to be declining on the Windward side of the Colony but little improvement is noticeable in a large section of the Leeward District which is damp and heavily wooded. No case (3) of *poliomyelitis* or of *diphtheria* was reported during the year.

Nineteen (18) cases of leprosy were treated at the Leper Asylum alepol (3 per cent solution) and E.C.G.O. were used in treatment, and local treatment twice weekly with trichloracetic acid. All the active cases are reported to show improvement.

An Eye Clinic intended primarily for school children paupers and persons of limited means was opened in October 1934 at the Colonial Hospital. Attendances were School children 284 paupers 41 and labourers 11.

Other diseases calling for mention are the following. Syphilis 784 cases and 36 deaths, gonorrhoea 579 cases under treatment (the majority of sufferers never see a medical man but are treated by "busk doctors" for what is regarded as a "female sickness") ascariasis 7,501 cases, enteroctoniasis 434 cases diarrhoea in children under two years 986 (1,005) cases with 71 deaths.

Financial—Total expenditure amounted to £11,985 (£13,832) or 15 1 (19·1) per cent. of the total revenue of the Colony.

TRINIDAD AND TOBAGO (1934)

Trinidad (area 1,864 square miles) is the most northerly of the West Indian Islands lying about 16 miles off the coast of Venezuela in latitude 10°N. Tobago (area 116 sq. miles) is some 21 miles north east of Trinidad.

The Committee appointed to consider the general organization of the Medical Service of the Colony and to advise on what steps should be taken for its improvement completed its Report (published as Council Paper 88, of 1934) in March, 1934. The recommendations made by the Committee included the following. The appointment of a Medical Advisory Council to the Surgeon-General, a more rapid and more extensive reconstruction of the older hospital buildings, an increase of medical staff with terms of service offering inducement to Medical Officers to specialize in different branches of work, the re-division of medical districts and appointment of private practitioners to do district work, a regrading of salaries of the Nursing, Dispensing, Sanitary and Bacteriological staffs, and an increase in such staffs, establishment of a special institution for treatment of tuberculosis and re-organization of methods of dealing with venereal diseases. Steps are being taken to give effect to the recommendations contained in the Report.

Vital Statistics—The mid year population of the Colony was estimated to be 428,715 (422,586). Registered births numbered 12,743 (13,134) with a birth rate of 29·7 (31·0) per 1,000 and registered deaths 7,987 (8,272) with a death rate of 18·8 (19·6) per 1,000.

The infant mortality rate for the Colony as a whole was 127·4 (131·3), for San Fernando 122·0 (135·3) and for Port-of-Spain 137 (134·4) per 1,000 live births.

Maternity and Child Welfare Work.—The Child Welfare League not only maintained existing services despite adverse conditions and economic difficulties but by generous benefactions was enabled to open two new branches; there are now 12 (10) branches and 18 (15) clinics established in the Colony.

The midwifery services at the various medical institutions were fully employed 610 (659) cases were admitted to the Maternity Ward in Port-of Spain 312 (273) in San Fernando 172 in Scarborough Tobago and in the District Hospitals 260 Total cases treated at public institutions for puerperal conditions numbered 2,941 (1,832) and 93 (93) hospital deaths were recorded.

Attendances of women at the ante natal clinics were Port-of Spain 1,339 (1,055) San Fernando 413 (572) and at the clinics for sick children 2,382 (2,161) and 889 (1,338) respectively.

School Hygiene—During the year 3,935 (4,978) school children were medically examined 1,874 (2,361) in Port-of Spain 1,334 (1,596) in Tunapuna District and 727 (1,596) in San Fernando Of the total 2,909 or 74 (75 1) per cent showed defects of one kind or another carious teeth being observed in 1,959 cases enlarged and septic tonsils in 975 cases The local distribution of defects observed was as follows Port-of Spain 65 5 per cent Tunapuna 73 6 per cent and San Fernando 96 1 per cent

Necessary treatments were carried out at special clinics. The results of medical examinations of school children are tabulated in detail with sex and age distinction. Spleen rates of children aged 4 to 8 examined in 18 areas are also given the proportion of children showing enlarged spleens ranges from 5 to 70 per cent of numbers examined in different localities

Public Health Sanitation etc—The systematic teaching of the principles of hygiene and their application is regarded as one of the most important duties of Medical Officers and Sanitary Inspectors

Health Week activities and Health Exhibitions play their part in emphasizing the observance of rules necessary for the preservation of good health. The conscientious and painstaking work of the Sanitary Inspectors who are regarded by the people as advisers upon matters concerning health and the prevention of disease receives special mention. Refresher courses for these officials were held three Sanitary Inspectors and one Meat Inspector obtained the Diploma of the Royal Sanitary Institute during the year

Piped water supplies are provided for the boroughs of Port-of Spain San Fernando and Arima, and Government piped supplies to a large number of localities in rural districts. In addition there exist private piped supplies and public springs encased with pipe leads in a number of places. With the above exceptions most of the water for drinking and domestic purposes is obtained from receptacles of various kinds river water etc mostly unsatisfactory as to quality and during dry periods inadequate as to quantity Good potable water will shortly be available throughout the greater part of the Island from the central water supply

Privy cesspits remain the usual methods of sewage disposal (see II/1 Bulletin 1933 Supp p 259*) in most of the rural districts Their replacement by bored hole latrines and the possibility of introducing the water-carriage system in certain areas are matters under consideration.

Considerable activity has characterized work connected with Housing and Town Planning schemes and in an Appendix the Building Inspector contributes a survey of the year's achievements. The (contn)

plans of the Government and the City Council for clearing and reconstructing slum areas in Port-of-Spain made further progress and the construction of workmen's dwellings proceeds.

The necessity for early action with regard to the general construction of markets and abattoirs in rural districts is again stressed. Inspection of meat is carried out by Sanitary Inspectors (see this *Bulletin* 1935 Supp. p 259*) Five dairies of the modern type supply high grade milk from tuberculin-tested cows and the pasteurization plants of the Trinidad Dairies, Ltd. are reported to have proved a great success. In a separate Appendix the Milk Inspector reports the results of inspections samples tested and other details of his work carried out during the year.

Port Health Work —No case of quarantinable disease was reported the last case of plague occurred in 1912 of yellow fever in 1914 and of smallpox (alastrim) in 1926. The major portion of arrivals come from places where quarantinable diseases are absent or of rare occurrence but the traffic by small sloops from the Orinoco and Delta regions is a source of some anxiety and requires special supervision. The Port Health Officer visited 389 (347) steamers, 338 (326) sailing vessels and 211 (210) aeroplanes of 22,706 persons inspected 335 (377) were placed under surveillance all for smallpox.

Hospitals Dispensaries Clinical Returns etc —Total admissions to medical institutions numbered 20,639 (19,635) and out patient cases treated were 166,626 as compared with 149,461 in 1933. The factors contributing to the remarkable increase in the demands made of hospital services during the past few years are discussed in the Report of Medical Organization Committee (Council Paper 60 of 1934) the Committee recommending a programme of reconstruction and extension which will ultimately make available 1,242 hospital beds in place of the present 853. During the year under review the principal diseases treated in hospitals and quoted in descending order of numerical importance were Intestinal ailments respiratory affections venereal diseases malaria, and enteric fever.

In addition to the treatment of disease the training of nurses continues to be an important function of the Colonial hospitals, and in this connection it is observed out of 24 nurses taking the first year examination 22 were successful, 18 out of 22 at the second year examination and 15 out of 22 at the final examination. In addition 15 students sat for the Midwifery Examination and 19 passed.

The following data taken from official returns indicate the volume of work undertaken at principal hospitals in the Colony during 1934 —

Hospital	No. of beds	Admis-sions	Deaths	Out patients
<i>Colonial Hospitals</i>				
Port-of-Spain	380	9,634	1,145	32,033
San Fernando.	182	5,063	498	31,845
Tobago	78	1,253	85	1,328
<i>Five district hospitals</i>	200	4,872	453	54,798

In addition to the above the Casualty Departments and special clinics established at the three Colonial Hospitals dealt with a very large increase in the numbers of cases.

At St Ann's Mental Hospital admissions were 227 as compared with 146 in 1933 the increase being particularly notable on the women's side the deaths of 111 patients were recorded.

Disease experience in general so far as medical institutions were concerned may be summarized as follows —

Malaria — The disease is not notifiable and it is therefore not possible to measure with accuracy the incidence throughout the Colony but it may be observed that District Medical Officers reported 19 439 (21 069) cases of benign and 110 (146) cases of malignant malaria during 1934. Total deaths in the Colony due to this cause were 606 (700). Cases treated in hospitals totalled 1 153 (1,275) differentiated as to 1 017 (1 081) benign tertian 52 (75) quartan 57 (55) subtertian, and 9 (11) defined as malignant. Hospital deaths due to malaria were 77 (98). Fourteen (7) cases of *blackwater fever* were reported with 6 (5) deaths. Conditions during 1934 appear to have been unfavourable to the spread of malaria in that rainfall throughout the year was much below the average, whereas *A. farcimaculatus* the principal vector is dependent upon a high rainfall for mass breeding.

The malaria survey was continued along lines similar to those previously described (see this *Bulletin* 1935 Supp p 262*) routine work in connection with the investigation of larval density and adult prevalence being maintained, while anopheline and topographical surveys were extended to upwards of a dozen new areas. That carried out in the Cumuto-Talparo-Tamana area proved of special importance disclosing the fact that high malaria incidence and mortality in those districts to be due to *A. bellator*. This species has so far been found to breed only in water holding the bromeliads (*Bromeliaceae*) which grow in abundance on almost every kind of tree in the hilly parts of the Island where rainfall is highest. Originally a forest mosquito this anopheles has effectively adapted itself to the changed conditions following forest clearance the development of cocoa estates and consequent increase in the human and stock (animal) population. The survey showed that *A. bellator* adults were numerous in houses adjoining cocoa estates between 4 and 8 p.m. that they bite commonly between these hours both in and out of doors when they appear to feed equally on man or beast that they retain their forest inheritance by refraining from remaining indoors after feeding with the result that they are rarely found resting on walls or on mosquito nets and that the eggs are able to survive long periods of drought and to develop in enormous numbers when the water in the bromeliads is replenished by the first rains of the season. The clearance of large areas surrounding villages etc. of all bromeliad bearing trees is one of several methods to be applied for the removal of this trouble.

Malaria control measures carried out in the Colony include (a) Drainage oiling and other works instituted by Local Health Authorities of the various sanitary districts (b) educational talks demonstrations exhibitions, cinema films and lectures etc. (c) major works carried out by the Public Works Department (d) prophylactic measures (see this *Bulletin* 1935 Supp p 263*)

SOUTH ATLANTIC

FALKLAND ISLANDS (1934)

The Falkland Islands are situated in the South Atlantic Ocean between 51° and 53°S latitude and 57° and 62°W longitude, some 480 miles N.E. of Cape Horn and 1,000 miles due south of Montevideo. They consist of East Falkland (area 2,580 square miles) and West Falkland (2,033 square miles). There are two groups of dependencies (1) South Georgia, with South Orkney and South Sandwich, and (2) South Shetland and Graham Land. South Georgia lies about 800 miles to the east of the Falkland Islands, and South Orkney and South Sandwich some 450 miles to the south-east and south-west respectively of South Georgia. South Shetland is 500 miles south of the Falklands.

Vital Statistics — The estimated population of the Colony on the 1st January 1934 was 2,427 and on the 31st December of the same year 2,437 comprising 1,368 males and 1,071 females. During the year 54 births and 28 deaths were recorded, the crude birth and death rates for the year being 21.18 per 1,000 and 11.49 per 1,000 respectively. The resident population of Georgetown was estimated to be 670 one birth and one death were registered during the year under review.

Maternity and Child Welfare — The out patient department of the hospital provides ante and post natal services. Of the 30 confinements recorded 20 occurred in hospital (1 death) 5 in town and 5 in camp.

Housing and Food — There is no housing problem. Many new houses of improved type have been built in recent years. Mutton, tea and bread constitute the staple diet of the Islanders. These items lack balance and variety and from points of view of quality and quantity are unsatisfactory. Defective diets may reasonably account for the relatively high incidence of dental caries, appendicitis, and constipation. Efforts are being made to improve existing conditions in these respects.

Clinical — The general health of the Islanders has been good, despite the occurrence of small outbreaks of scarlet fever (3 cases), impetigo (4 cases), influenza, ringworm, chickenpox (4 cases) and measles (confined to one family). 17 cases of tuberculosis of which 7 were pulmonary were noted during the year. 7 deaths (2 males and 5 females) were ascribed to this cause which appears to show definite signs of being on the increase.

Malaria or other insect-borne diseases are unknown and the only helminthic disease met with is due to *Enterobius vermicularis* which has a wide distribution among the Islanders. No case of venereal disease was reported during the year. Appendicitis is still very common, 25 cases being operated on for this condition. Among Government officials several cases of a form of melancholia were noted. This condition is ascribed to climatic and general conditions characterising life in the Colony. The hospital contains 12 beds, operating theatre, nurses' quarters, etc. The senior Medical Officer recommends various alterations and additions for improvement.

General Sanitation — The water supply is wholesome and satisfactory but will need to be increased to meet future requirements. Dairies and slaughter houses are subjected to periodical visits.

tested, and meat designed for human consumption regularly inspected. Arrangements made for scavenging and for sewage disposal are adequate and efficient.

School Hygiene—Special attention is devoted to the hygiene of schools and school children. Medical officers and the Dental Surgeon visit the schools at regular intervals and during these visits careful medical and anthropometric records are kept of every child.

The Appendices—That of the Medical Officer at Fox Bay, West Falklands supplies a report of cases and diseases occurring at Fox Bay since the autumn of 1933. The epidemic of influenza which affected the whole of Pebble Island is presumed to have followed infection introduced as a result of the visit of V V Gentoo. *Gastric enteritis* and *anaemia* appear to affect many of the people—the latter condition probably results from deficient dietaries—the former—which occurs only in summer—from drinking water contaminated by passing through grazing pastures. The report of the Dental Surgeon refers to his visits to the camps in the East Falklands and in West Island, and to the dental condition of school children in the Colony.

Financial—Expenditure in respect of the medical services of the Colony amounted to £4,958 15s 2d. What proportion this bears to the total Revenue of the Colony is not stated.

SOUTH ATLANTIC

FALKLAND ISLANDS (1934)

The Falkland Islands are situated in the South Atlantic Ocean between 51° and 53°S latitude and 57° and 62°W longitude some 480 miles N.E. of Cape Horn and 1,000 miles due south of Monte Video. They consist of East Falkland (area 2,580 square miles) and West Falkland (2,038 square miles). There are two groups of dependencies (1) South Georgia, with South Orkney and South Sandwich, and (2) South Shetland and Graham Land. South Georgia lies about 800 miles to the east of the Falkland Islands and South Orkney and South Sandwich some 450 miles to the south-east and south west respectively of South Georgia. South Shetland is 500 miles south of the Falklands.

Total Statistics—The estimated population of the Colony on the 1st January 1934 was 2,427 and on the 31st December of the same year 2,437 comprising 1,368 males and 1,071 females. During the year 54 births and 28 deaths were recorded the crude birth and death rates for the year being 21.16 per 1,000 and 11.49 per 1,000 respectively. The resident population of Georgetown was estimated to be 670 one birth and one death were registered during the year under review.

Maternity and Child Welfare—The out patient department of the hospital provides ante- and post natal services. Of the 30 confinements recorded 20 occurred in hospital (1 death), 5 in town and 5 in camp.

Housing and Food—There is no housing problem. Many new houses of improved type have been built in recent years. Mutton tea and bread constitute the staple diet of the islanders these items lack balance and variety and from points of view of quality and quantity are unsatisfactory. Defective dietaries may reasonably account for the relatively high incidence of dental caries, appendicitis, and constipation. Efforts are being made to improve existing conditions in these respects.

Clinical—The general health of the islanders has been good, despite the occurrence of small outbreaks of scarlet fever (3 cases), impetigo (4 cases), influenza, ringworm, chickenpox (4 cases) and measles (confined to one family). 17 cases of tuberculosis, of which 7 were pulmonary were noted during the year. 7 deaths (2 males and 5 females) were ascribed to this cause which appears to show definite signs of being on the increase.

Malaria or other insect-borne diseases are unknown, and the only helminthic disease met with is due to *Enterobius vermicularis* which has a wide distribution among the islanders. No case of cerebral disease was reported during the year. Appendicitis is still very common, 25 cases being operated on for this condition. Among Government officials several cases of a form of melancholia were noted this condition is ascribed to climatic and general conditions characterizing life in the Colony. The hospital contains 12 beds, operating theatre, nurses' quarters etc. the senior Medical Officer recommends various alterations and additions for improvement.

General Sanitation—The water supply is wholesome and satisfactory but will need to be increased to meet future requirements. Dairies and slaughter houses are subjected to periodical visits, milk samples

VITAL STATISTICAL SUMMARY FOR 1934—continued

269.

Territory	Estimated population	Births	Birth rate	Deaths	Death rate	Infant mortality	Infant mortality rate	Remarks
INDIAN OCEAN—contd. Seychelles	29,406 (28,731)	882 (821)	29.3 (28.6)	317 (346)	10.8 (12.1)	42 (87)	48.7 (81.6)	(1) For racial and local distribution, see text (2) Included in total above
FOR EAST— Federated Malay States	1,631,728 (1,597,770) ¹	57,687 (56,787)	35.4 (35.5)	31,983 (32,340)	21.4 (20.2)	— (28.5)	163 (146)	(1) Excluding stillbirths, see text
Strait Settlements	1,057,108 (1,038,827) ¹	42,974 (42,539)	40.7 (40.8)	28,058 (25,201)	20.5 (24.2)	— (20.9)	171.9 (168.0)	(1) Excluded in total above
Singapore Mala- poly	184,983 (477,280) ¹	17,329 (16,881)	35.7 (35.4)	10,162 (8,187)	20.9 (20.1) ²	3107 (2,880)	179.3 (170.5)	(1) Excluded in total above (2) Corrected resident's only rate is 20.5
Penang, Malaya- pally	8,907 (8,786) ¹	— (—)	— (—)	— (—)	— (—)	— (—)	— (—)	(1) Excluded in total above
Penang, Muall- ipally	159,085 (158,014) ¹	4,977 (5,052)	31.3 (32.4)	3,935 (3,592)	24.7 (23.9)	777 (737)	158 (146)	(1) New method of estimation, see text
H. 1,296 (1,271) ¹	39 (32)	30.1 (25.2)	2 (6)	1.5 (4.0)	— (—)	— (—)	— (—)	(1) Excluding stillbirths, see text
Unfederated Malay States— Johore	499,370 (487,924) ¹	29,559 (29,181)	41.2 (41.4)	12,850 (9,741)	25.7 (20.9)	4,697 (3,010)	223.5 (149.2)	Vital statistics probably inaccurate
Kedah	463,270 (453,398)	19,763 (17,035)	38.0 (37.5)	10,163 (9,247)	21.8 (20.3)	2,475 (2,388)	148.0 (140.8)	(1) Increased figures attributed to more efficient registration.
Perlis	52,723 (51,641)	1,664 (1,344)	31.6 (28.0) ¹	885 (835)	16.8 (16.6)	139 (134)	83.4 (88.4)	
Kelantan	388,509 (383,090)	11,093 (10,972)	28.7 (27.7)	7,309 (6,439)	19.4 (17.4)	441 (423)	130.1 (131.5)	
Trengganu	— 149,161 (148,227)	6,330 (7,075)	33.5 (38.0)	4,590 (3,619) ¹	24.3 (19.4)	1,401 (1,159)	221.3 (1163.7)	

INDEX OF NAMES AND SUBJECTS

A.

- Adams A R D 146
 Adams, F V 52*
 Aerial Traffic Sanitary Control of,
 105 164 173* 174 222* 233
 280*
 Alastrum (see Smallpox)
 Alleyne J D 218
 Amoebiasis, 62
 Anaemia, megalocytic, 228*
 Anaemia, sickle cell, 15
 Anguilla, 247
 Anthrax 40 53* 77 108 112*
 122*
 Antigua, 241 *43*
 Arab Legion, Palestine 110*
 Archibald, Sir R G 45*
 Asthma, 144 150*
 Attygalle N 138
 Austin, C J., 207
 Austria, T A 62*
 Aziz, M 116

B

- Bahamas, 216* 217
 Barbados, O D 49*
 Barbados, 218 -220*
 Barrett, R E, 49*
 Basutoland, 79*-81
 Bechuanaland 81 -85
 Beriberi, 56 145 134 159 168*
 170* 177 182* 19** 194 201
 210 215 227*
 Bermuda, 221 -223
 Blackwater Fever 11 21 28* 33*
 39* 46* 52* 61 67 75 83*
 97* 106* 143 155 164 211
 228* 230 236 261
 Boer Dr de 73
 Boncluffe, R 133 140
 British Guiana, 223* -229*
 British Honduras, 229*-231
 British Solomon Islands, 208*-212*
 Brunei, 192*-194
 Bryant, J 101

C

- Cancer 30* 101 118* 124 150*
 166* 202* 220* 228* 242*
 Carnie, W M 47
 Cauchi, J 15
 Cayman Islands, 230*

- Cerebrospinal fever 12* 22* 40* 48*
 54 63* 71 76* 96* 107* 112*
 141 156 163 200*
 Ceylon, 127*-141
 Chambers, W M 151
 Chickenpox, 84 71 76* 81 98
 112* 125 134 147* 170* 172*
 181 206* 232* 246* 252* 255
 257* 284
 Cholera, 23 84 134 158* 173*
 187* 232*
 Chorley C W 46*
 Clark, A 9*
 Clark, M, 172*
 Climatic baby (see General Diseases).
 Coarie, T 207*
 Co-operative Public Health Work,
 Jamaica, 223*
 Conson, J F 56*
 Cuff C H 116* 117* 118*
 Cypress, 11 -116*

D

- Diphtheria Disease, 8* 30* 56* 63*
 69* 80* 84 138* 144 172* 177*
 217* 220*
 - Disease here, 187*
 Dengue, 149* 187* 217* 231
 Dental Clinics, 49* 74 132* 223*
 228* 232*
 De Soyza Lyngda Home, Ceylon, 127*
 Diphtheria, 12* 40* 98* 107* 117*
 121 125 135 156* 163 170*
 172* 182* 200* 206* 217* 221*
 228* 237*
 Dominica, 243*-245
 Dropsey epidemic, 206*
 Duff, D, 18
 Dyke, H W 83*
 Dysentery 13* 23 29* 33* 36* 45*
 54 62* 63* 71 76* 80* 84 85*
 97* 107* 111 116* 122* 133*
 144 149* 157 165 172* 178*
 182* 183* 187* 191 194 201
 206* 211 214 217* 220* 226*
 230* 237* 245 248* 252* 254
 255*

E

- Earia, W C, 254
 Elmes, B G T 15
 Entero Fever 12* 23 29* 38* 54
 62* 63* 71 76* 79* 85* 87*
 106* 111 115 121 125 134*

147 156* 185 170 172 177
 157* 190* 191* 200 206 216
 227* 228* 238 230 237 239
 24 245 246 248 232 254
 257 162*

Epidemic service Trans-Jordan, 111
 Expenditure (see under Financial)

F

Fairburn, H. 56
 Falkland Islands, 264*-265
 Federated Malay States 151-159

Fernando, B. E., 139
 Fernando, G. F., 139
 Fernando P. B., 139
 Fernando S. E., 139*

Fip, 204-209*
 Financial, 16 24 31 34* 43 49*
 57* 64 69* 72 78 81 85 88
 109* 112* 118 122* 141 147
 150* 159 167* 171 179* 182
 184 188 192 194 202* 209
 212* 215 217 220 223 229
 231 239 243* 245 246* 249
 252* 255 258* 263 265

Findlay, Dr., 22

Food, 10 19* 51 66* 70 73 87
 93 104 120 123* 130 142
 148 154 163 174 181 187
 205 216* 221 225 232* 241
 243 251 256* 260 264

Fournier C. J., 222*

G

Gambia, 31-34
 Georgetown (British Guiana) 223*
 German Measles, 240
 Germund R. C. 80*
 Gibbons, E. G., 49*
 Gibraltar 119*-122
 Girolami, G., 228
 Gilbert, F. W., 77
 Gilbert and Ellice Islands, 212*-215
 Gill, C. A., 133
 Gold Coast Colony 16*-24
 " Go Otsela, 84
 Gopall, W. L., 63
 Gordon Memorial College, 93
 Gordon, M. 118
 Gora, 123-128
 Grenada, 250-252
 Gunawardene, H. C. P. 139*
 Gunawardene, H. O., 139*

H.

Hadassah Medical Organization 103
 Hancock, G. L. R., 48*
 Haslam, J. F. C., 78* 218* 219*
 Health Units, Ceylon, 130
 Heber Dr 205

Helig Berries (*Balanites aegyptiaca*)

48 56
 Helminthiasis, 14 24 29 33 41
 47 58 62 66 67 77 84 88
 99 108 117 136 144 150
 177 181 184 188 191 194*
 206 212 214 217 220* 231*
 223 240 242 244 245 249
 252 254 258 263 264

Henderson L. H. 100

Hennessee R. S. F. 49

Hewitt Dr. 101

Hodgkin E. P. 158

Hole C. G. 139

Hong Kong, 193 203

Hookworm Commission, Jamaica, 233

Hopkins, C. H. F. 49

Hospitals Dispensaries Clinical
 Return, etc 11 20 27 32* 37
 45 52* 61 68 70 75 79 82
 87 95 105 110 115* 120*
 124 131 142 149 154* 164
 172 176* 181 183 185* 189
 193 197 205 210 213 216*
 219 221 225 230 235 242
 244 248 251 253 257* 260
 264

Ho Tung Sir Robert and Lady 196

Housing and Town Planning, 10 27
 37 59 66 74 82 87 88
 104 114 154 163 181 222*
 225 256 259

Hunter P. S. 172 173

Hygiene Training for School Teachers,
 etc. 131 216

I.

Infantile Paralysis (see Poliomyelitis)

Influenza, 48 53 62 68* 71* 78
 79 84 108 112 120* 125
 135 147 177 191 205 211
 214 240 242* 249 252* 257
 264 265

J

Jackson, R. B. 200

Jamaica, 231*-239*

Jamaica Public Health, issues of, 233

Jayamriya, J. H. F., 139*

Jeunes School, Nyasaland, 37 59*

Johore 175-178*

Jones, A. G. F., 15

K.

Kala azar 100 122*

Kannan W. H., 45

Kedah, 179*-182*

Kelantan, 184-188

Kenya, 35-43

Kenya, Tribal areas, surveys in, 36*
 41
 "Kigogweza," 34
 King Edward VII College of Medicine,
 Singapore, 167*
 Kitchener School of Medicine, 84
 Kuala Lumpur Institute for Medical
 Research, 152* 157*

L.

Laboratory Assistants, training of,
 37* 65

Laboratory Work, 15 24 31 34
 41 48* 57* 64 68* 72* 77
 103 112* 117 122* 137 145
 150* 167 174 178* 182* 202*
 207 217 220 225* 233* 249
 255 263*

Labourers, Health of, 9* 20* 27 45
 53 74 82* 87* 115 152* 165*
 173* 180* 183* 185 189* 210*
 222*

Lady Coryndon Training School,
 Uganda, 44

Lady Grey, Welfare League, 36*

Lambert, S. M. 70* 211

Lambora, W. A. 63* 64

Leeward Islands, 241 -249*

Leprosy 14, 24 29* 33 40* 45*
 65 68 68* 71 77* 84 86* 98
 117* 120* 135 145 158* 165
 178* 182* 187 19** 201 208*
 213* 214 217* 219* 222* 237
 238* 240* 243 246* 248 252*
 255 258* 263*

Lester H. M. O. 13* 15

Lewthwaite R. 158*

Lister Sir Spencer 42*

M.

MacCormick, A. M. 111

Macdonald, D. R. 94

McDonald, W. M. 241

MacKay R. 53*

MacLean, G. 55

Malawi, 21 23 28 33* 35* 46
 53* 61 66* 70* 73 83 88
 86* 106* 111 118 121 133
 143* 149* 155 164 169* 177
 181 183* 185* 190* 193* 196*
 211 217* 220* 226* 230* 234
 236* 238* 240* 242 244 246*
 248* 249* 251 254 257* 261
 264

Malaya Commission, Jamaica, 234

Malaya Epidemic, Ceylon, 127* 133*

Maltese Islands, 123 -128*

Mankodor, C. S. 118*

Marshall, R. S. 15

Maternity and Child Welfare, 8* 17*

25 31 35 44 50* 60* 63 70*

73 81 85* 92* 102* 105* 113*
 119* 128* 141 147* 157* 161
 169* 172* 176* 180* 185 189*
 193* 198 204 213* 216* 218*
 221 224 229* 231 241 243*
 247 250* 253* 256* 258* 264

Mauretania, 141 -147*

Mayne L. C. 73*

Meekins, 54 71 76* 88* 107* 117*
 125 133 191 208* 227* 257*
 257* 264

Medical Education, 16 41* 49* 57*
 89* 94 139* 147

Medical Outposts, 87

Medical Surveys, Nyassaland, 69*

Melroy P. 130*

Missions, medical work of, 11 21
 36* 38* 52* 59* 73 82* 87*
 93 103 110* 203 210* 214

Montserrat, 245 -46

Moore, Fitzgerald, 9*

Morris, H. R. S. 23*

Mosquito, 54 112* 120* 133 177*
 191 227*

N.

Nash, T. A. 14 23*

Nature Reserve, 36* 87*

Navarathnam, S. L. 130*

Nesbitt, Sir R. 187

Nephritis 220* 228*

Nervia, 247*

Nicholls, L. 130*

Nigeria, 7 -15*

Northern Rhodesia, 73*-78*

Nurses, Training of, 92* 102* 130*

Nyassaland, 38*-64

O.

Ondenka, Nurse Training School
 82

Onderdown, School of Midwifery 82*

Ophthalmic Clinic, 30* 100 106*
 117* 128* 137* 202* 229* 236*

Owen, A. H. 80*

P.

Palestine, 103*-109*

Paterson, A. R. 37* 40*

Patton, W. S. 43*

Pawson, J. L. 263

Payne E. G. H. 221

Pellagra, 63* 80* 84 217* 227*
 240* 243*

Pennac, 168*-171

Perilla, 182*-184

Pilgrim, 64 105 110*

Pinge, 12* 23* 29* 33* 39* 47*
 41 68* 85 103 117* 120* 134

143	156	173	187	201*	203*
226*	252*	280			
Pneumonia	40	67	120*	125	
144*	157	165*	170	177	182*
184*	187*	194*	201	210	227
243	249*	262			
Poliomyelitis	72*	107*	206	220	
233*	237*				
Port Health Work	19	27	37*	52,	
75	94*	105*	120	124	131
184	197*	203*	213*	219	222*
225*	233	251*	253	257	280
Propaganda, health	59	114	154*		
162*	163*	233	239*		
Public Health, General Sanitation, etc.					
9*	18*	26*	32*	36	45
63	70	74*	82*	86*	93
110	114*	119	123	129*	142*
148	153*	163	169*	173	178
180	185	189*	193*	197	205
210*	213*	216*	219*	221	224*
229*	232*	241	243	246*	247
250*	253*	256	259		
Refuse Disposal	10	19*	28*	32*	
59	68	104	110*	120*	129
142	148*	153	163	181	185
189	183	197	216*	225	229
232*	243*	251	253	256*	259*
265*					
Sewage Disposal	10	19*	26*	31	
59*	66*	74	82	88*	104
120	129*	142	148*	153	163
176*	180	185	188*	183*	197
205	216*	225*	229*	232	243
231	233	256*	259	285	
Water Supplies	10	18	26*	33*	
45	51	59	66*	74	86*
103	110*	114	120	123*	130
142*	148	153*	163	178	181
165	189*	183	197	205*	216*
221*	225	229*	232*	238*	241*
243	251	253*	256*	258*	264
Q					
Quarantine Camps	71	94	105*		
110	124	131	154		
R					
Rabies	12*	30*	71	77*	88
112	122*	138*	184	188	201
262*					
Railway Medical Service, Palestine	105				
Ratnasyke M.	139*				
Refuse Disposal (see Public Health, Sanitation, etc.)					
Relapsing Fever	12*	23	40	49*	
63*	71*	78*	103*		
Ringworm	264				
Rose, F G.	227				
Russell, S.	17				
Ruttonjee, H.	196*				
Ryle G A.	158*				

					S.						
					Sanitary Personnel Training of						
					10						
					20*	41	51*	57*	89*	94*	142*
					149*	163	219	221*	238	251	259*
					St. Christopher	247*	249*				
					St. Lucia	253	-255				
					St Vincent	258*	-258*				
					Savor S. R.	158					
					Scalnes	89*	147	192			
					Scarlet Fever	107	112	125	208		
					222*	284*					
					Schistosomiasis and <i>Balantidium</i> <i>egypti</i>						
					<i>taurus</i>	14	24	30*	41*	48*	56
					63	67	77	84	88	99	117*
					144	255					
					Schistosomiasis Research, Mauritius,	145					
					School Hygiene	9	18	26*	32*	38*	
					45	51	65	74	82*	86	93
					103	109*	114	119	128*	148	
					153	162*	176*	180*	183*	185	
					189*	196	205	218	224	229*	
					232	240*	244*	247	250	258*	
					259*	263					
					Scott, R. R.	50	56				
					Scurvy	56*	84*	143*	215*		
					Sewage Disposal (see Public Health Sanitation, etc.)						
					Seychelles	147	-150				
					Seymoor F R.	221*					
					Shelley H. L.	84					
					Sierra Leone	25	-31				
					de Silva, S.	139*					
					Singapore	171*	-174*				
					Smirnansky G. S.	139*					
					Smallpox	12*	23	33*	39	49*	53
					62	68*	71	76	93	107	111*
					117	121	126*	134	143	156*	
					165	171	173	187*	200*	214	
					216*	226*	230*	233	248	260*	
					Smith, E. C.	15*					
					Somaliland	70	-72*				
					Sparre E. C.	139*					
					Straits Settlements	180	-187*				
					Sudan	90	-101*				
					Sudan blindness	101					
					Sugar Estates	226*	228				
					Swaziland	85	-86*				
					Sweeney J. P.	222*					
					Szent-Gyorgyi, Professor	19*					
					Tanganyika	50*	-57*				
					Thomson, Professor J. G.	64*					
					Trachoma	100*	117	126			
					Trans-Jordan	109*	-112*				
					Trengganu	188*	-192*				
					Tribal Dispensaries	52*	87*				
					Trinidad and Tobago	238*	-283				
					Trypanosomiasis	13*	22*	31	33*		
					40	46*	55	63*	77	84	101
					145						
					Tuberculosis	13*	24*	29*	40*	47	
					54*	63*	87*	71	77	80*	83*
					100*	107	111*	116*	121	125	127
					135	144	157	165	170	177	

